SMART/RG®
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501 SE Columbia Shores Boulevard, Suite 500
Vancouver, Washington 98661 USA
+1 360 859 1780 / smartrg.com

/ Gateway User Manual

Model: SR516ac

Release 1.1

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SMART/RG

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Welcome!

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SmartRG offers solutions that simplify the complex Internet ecosystem. Our solutions include hardware, software, applications, enhanced network insights, and security delivered via a future-proof operating system. Based in the USA, SmartRG provides local, proactive software development and customer support. We proudly offer the best, most innovative broadband gateways available.

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Purpose & Scope

This Gateway User Manual provides SmartRG customers with installation, configuration and monitoring information for the gateway.

Intended Audience

The information in this document is intended for Network Architects, NOC Administrators, Field Service Technicians and other networking professionals responsible for deploying and managing broadband access networks. Readers of this manual are assumed to have a basic understanding of computer operating systems, networking concepts and telecommunications.

Getting Assistance

Frequently asked questions are provided at the bottom of the Subscribers page of the SmartRG Web site.

Subscribers: If you require further help with this product, please contact your service provider.

Service providers: if you require further help with this product, please open a support request.

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Getting Familiar with your Gateway

This section contains a quick description of the gateway's lights, ports, and buttons to help you get familiar with the SR516acmodel.

LED Status Indicators

The indicator lights (LEDs) on the front of the SR516ac gateway can help you understand the state of your gateway.

Legend: 🟢 Green ✹ Green Blinking 🔴 Red

LED	Action	Explanation
All LEDs *except* those listed below	🟢 ✹	Feature enabled & / or working correctly Data being transferred
POWER	🔴 🟢	Unit is booting up & preparing for use. When the unit is ready, the light changes to green. Device powered on and ready for use
DSL	🟢	DSL connected
INTERNET	🟢 ✹ 🔴	DSL sync acquired and gateway on line Data being transferred Internet authentication / connection has failed

Connections

The ports located on the back of the gateway and the buttons and ports located on the left side of the gateway, are described below.

Feature	Description
Rear panel	
DSL	This grey RJ11 port is used to connect your gateway to an Internet provider via a DSL service.
LAN 1 - 4	The yellow RJ45 ports can be used to connect client devices such as computers and printers to your gateway.
WAN	The blue RJ45 port is used to hard-wire your gateway to another network device. For models with both WAN and DSL ports, when your Internet connection is via DSL, you can configure the WAN port to function as an additional LAN port. For detailed instructions, see the Ethernet Mode section of this manual.
USB 1	Can transfer data, act as a printer interface, and handle a 3G accessory.

Feature	Description
Power	Use only the power supply included with your gateway. Intended for indoor use only.
Left side	
On/Off	Power switch.
5GHz	Enables or disables the 5GHZ wireless function.
2.4GHz	Enables or disables the 5GHZ wireless function.

External Buttons

Smart RG gateways provide push-button controls on the exterior for critical features. These buttons provide a convenient way to toggle the Wi-Fi radio on and off or reset the gateway. These controls are described below.

2.4GHz and 5GHz Buttons

Note: On early production units of the SR516ac gateway, these buttons are labeled WiFi (instead of 2.4 GHz) and WPS (instead of 5 GHz).

These buttons are located on the left side of the gateway and control the Wi-Fi radio functions.

To turn a wireless radio on or off, press the related button briefly (1-2 seconds). For example, to turn the *2.4 GHz* radio on or off, press the **2.4GHz** button for 1-2 seconds.

To enable WPS, press the related button and hold it for 4-6 seconds.

Reset Button

The **Reset** button is a small hole in the back of the gateway with the actual button mounted beneath the surface. This style of push-button prevents the gateway from being inadvertently reset during handling.

Warning: Do not press the **Reset** button unless you are sure that you want to clear the current settings.

To reset your gateway, use a fine wire (such as a paper clip) to press the button for 7-10 seconds and release. The factory default settings are restored.

Installing your SR516ac Gateway

1. Connect one end of the included phone cable to the **DSL** port on the gateway and connect the other end to the wall jack.
2. Connect one end of an Ethernet cable to a **LAN** port of the gateway and connect the other end to your PC.
3. Plug the power adapter to the wall outlet and then connect the other end of it to the **Power** port of the gateway.
4. Turn on the unit by pressing the On/Off button on the left side of the gateway.

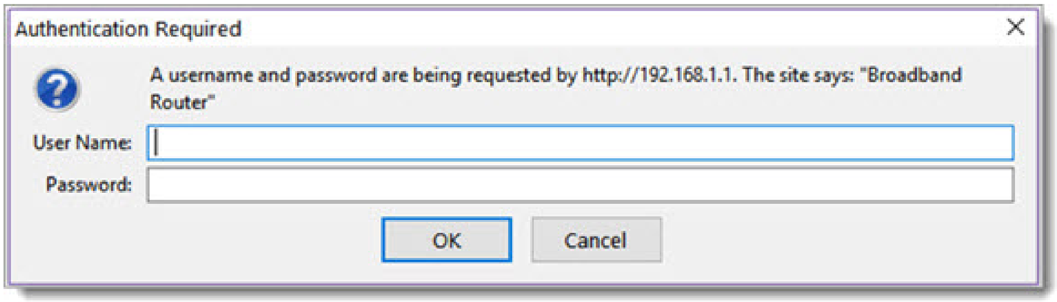
Your gateway is now automatically being set up to connect to the Internet. This process may take a few minutes to complete before you can begin using your Internet applications (browser, email, etc.).

If you are unable to connect to the Internet, confirm that all cable connections are in place and the router’s power is turned on.

Logging in to your Gateway's UI

To configure the SmartRG SR516ac gateway's settings, access the gateway's embedded UI.

1. Open a Web browser on your computer.
2. In the address field, enter http://192.168.1.1 (the default IP address of the DSL gateway). The authentication dialog box appears.



Authentication Required

A username and password are being requested by http://192.168.1.1. The site says: "Broadband Router"

3. Enter the user name and password. The default user name and password of the super user are admin and admin. The username and password of the common user are user and user. It is recommended that you change these default values after logging in to the DSL gateway for the first time.
4. Click **OK**. The Network Status page appears.
5. To view the log for this gateway, click **View log** at the bottom of the page. The log appears in a separate window.
6. To log into the GUI, at the bottom of the page, click **Manage gateway (advanced)**. The gateway interface appears, showing the Device Info summary page.

Device Info

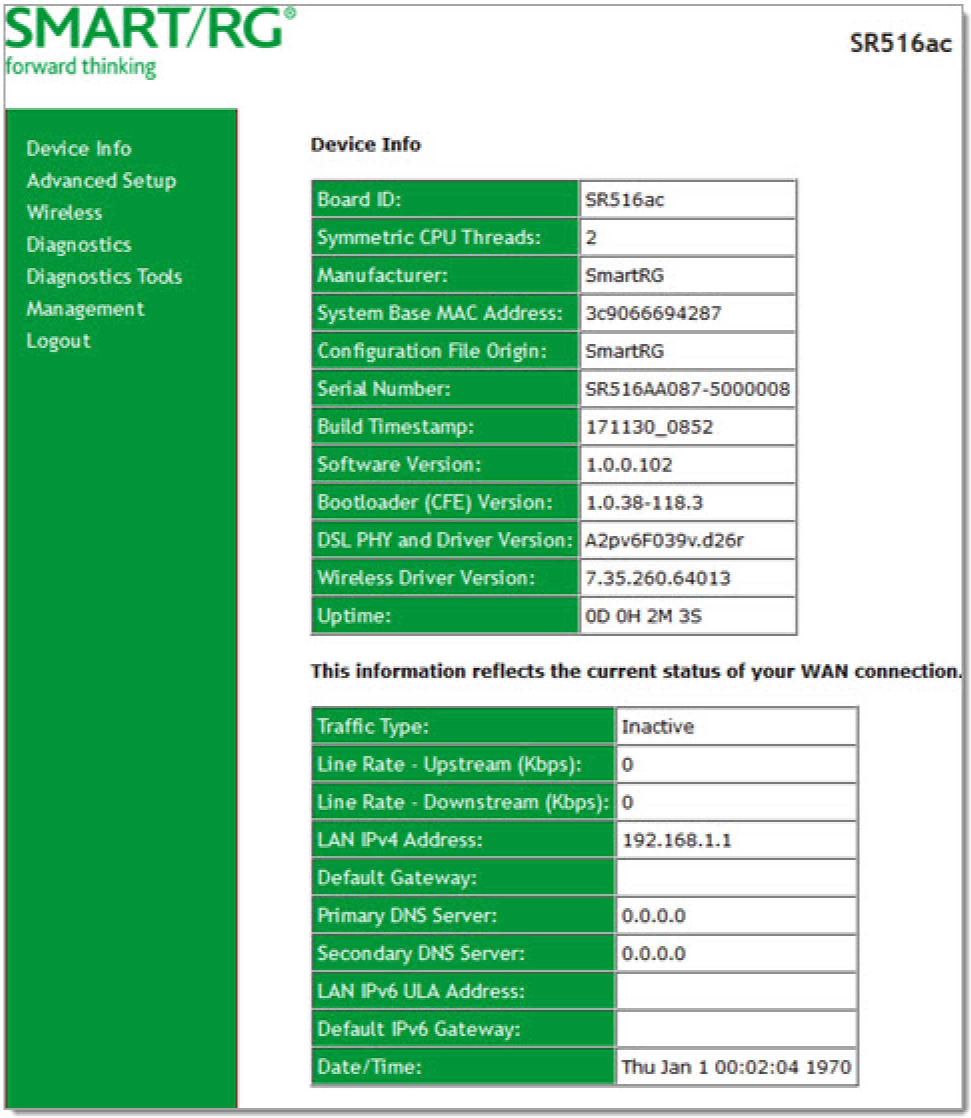
In this section, you can view data about your gateway and network, and configure DHCP, ARP, and WAN interfaces.

Summary

On this page, you can view device information such as the board ID, software version, and information about your WAN connection such as the upstream rate and the LAN address.

When you log into the gateway GUI, the Device Info summary page appears.

You can also reach this page by clicking **Device Info** > **Summary** in the left menu.



Device Info

Board ID:	SR516ac
Symmetric CPU Threads:	2
Manufacturer:	SmartRG
System Base MAC Address:	3c9066694287
Configuration File Origin:	SmartRG
Serial Number:	SR516AA087-5000008
Build Timestamp:	171130_0852
Software Version:	1.0.0.102
Bootloader (CFE) Version:	1.0.38-118.3
DSL PHY and Driver Version:	A2pv6F039v.d26r
Wireless Driver Version:	7.35.260.64013
Uptime:	0D 0H 2M 3S

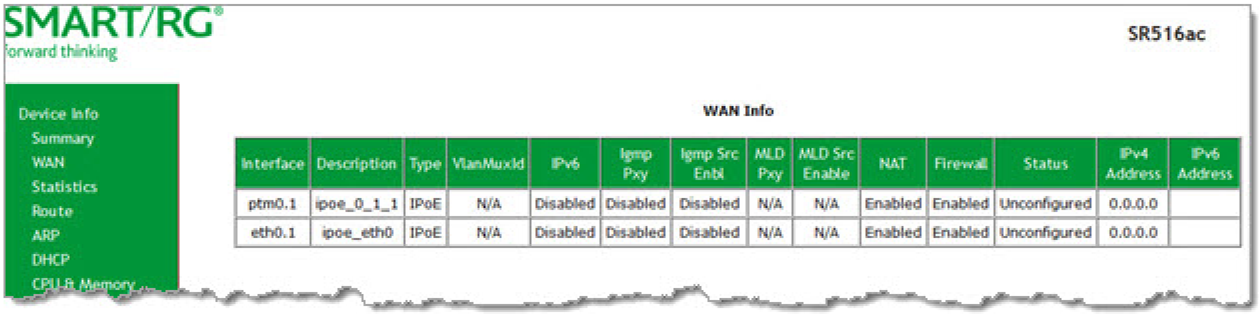
This information reflects the current status of your WAN connection.

Traffic Type:	Inactive
Line Rate - Upstream (Kbps):	0
Line Rate - Downstream (Kbps):	0
LAN IPv4 Address:	192.168.1.1
Default Gateway:	
Primary DNS Server:	0.0.0.0
Secondary DNS Server:	0.0.0.0
LAN IPv6 ULA Address:	
Default IPv6 Gateway:	
Date/Time:	Thu Jan 1 00:02:04 1970

WAN

The WAN status screen provides a high level overview of the connection between your Internet Service Provider and your gateway device. The WAN interface can physically be DSL or Ethernet and supports a number of Layer 2 and later configuration options covered later in this document.

In the left navigation bar, click Device Info > WAN. The following page appears.



WAN Info

Interface	Description	Type	VlanMuxId	IPv6	Igmp Pxy	Igmp Src Enbl	MLD Pxy	MLD Src Enable	NAT	Firewall	Status	IPv4 Address	IPv6 Address
ptm0.1	ipoe_0_1_1	IPoE	N/A	Disabled	Disabled	Disabled	N/A	N/A	Enabled	Enabled	Unconfigured	0.0.0.0	
eth0.1	ipoe_eth0	IPoE	N/A	Disabled	Disabled	Disabled	N/A	N/A	Enabled	Enabled	Unconfigured	0.0.0.0	

The fields on this page are defined below.

Field Name	Description
Interface	The connection interface (Layer 2 interface) through which the gateway handles the traffic.
Description	The service identifier such as **pppoe_0_1_1.35.**
Type	The service type. Options are **PPPoE**, **IPoE**, and **Bridge**.
VlanMuxId	The VLAN ID. Options are **Disabled** or **0 - 4094**.
IPv6	The state of IPv6. Options are **Enabled**, **Disabled**, and **N/A**.
Igmp Pxy	The state of the IGMP proxy. Options are **Enabled**, **Disabled**, and **N/A**.
Igmp Src Enbl	The state of the IGMP source. Options are **Enabled** and **Disabled**.
MLD Pxy	The state of the MLD proxy. Options are **Enabled**, **Disabled**, and **N/A**.
MLD Src Enable	The state of the MLD source. Options are **Enabled**, **Disabled**, and **N/A**.
NAT	The state of NAT. Options are **Enabled** and **Disabled**.
Firewall	The state of the Firewall. Options are **Enabled** and **Disabled**.
Status	The status of the WAN connection. Options are **Disconnected**, **Unconfigured**, **Connecting**, and **Connected**.
IPv4 Address	The obtained IPv4 address.
IPv6 Address	The obtained IPv6 address.

Statistics

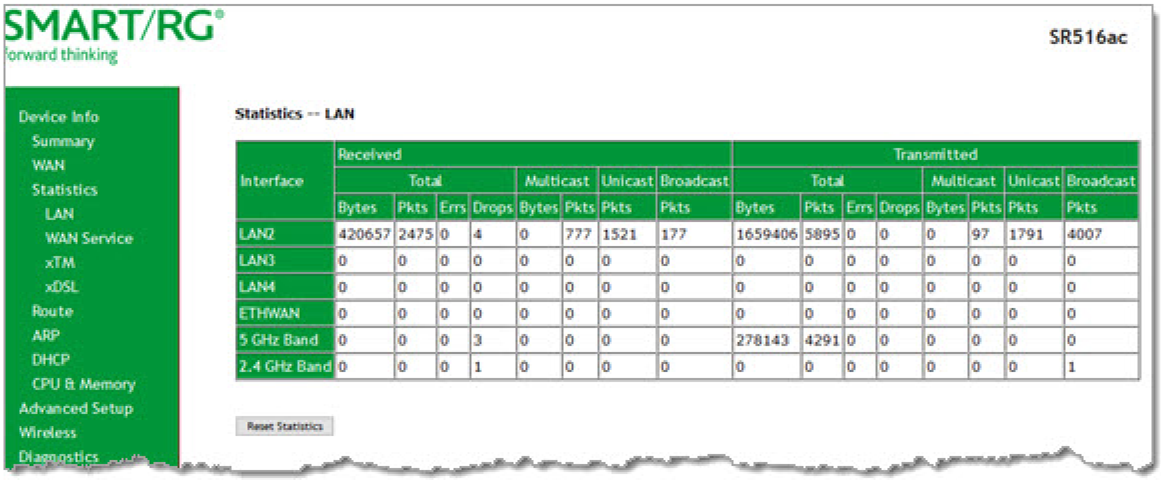
In this section, you can view network interface information for LAN, WAN Service, xTM and DSL. Data is updated at 15-minute intervals.

LAN

On this page, you can view the received and transmitted bytes, packets, errors and drops for each LAN interface configured on your gateway. All local LAN Ethernet ports, Ethernet WAN ports and wireless interfaces are included.

In the left navigation bar, click **Device Info** > **Statistics**. The Statistics - LAN page appears.

To reset these counters, click **Reset Statistics** near the bottom of the page.



Statistics -- LAN

Interface	Received								Transmitted							
	Total				Multicast		Unicast	Broadcast	Total				Multicast		Unicast	Broadcast
	Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts	Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts
LAN2	420657	2475	0	4	0	777	1521	177	1659406	5895	0	0	0	97	1791	4007
LAN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAN4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETHWAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 GHz Band	0	0	0	3	0	0	0	0	278143	4291	0	0	0	0	0	0
2.4 GHz Band	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

The fields on this page are defined below.

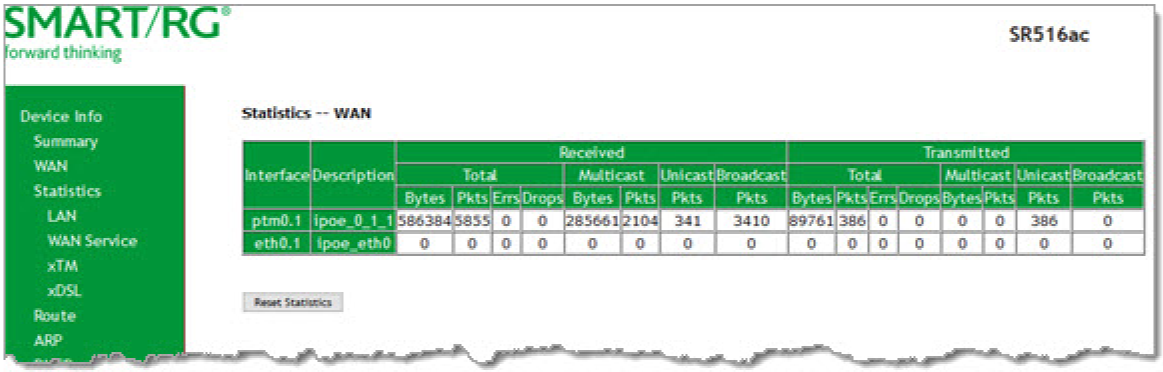
Field Name	Description
Interface	Available LAN interfaces. Options are **LAN1** - **LAN4**, **ETHWAN**, **5GHz Band**, and **2.4 GHz Band**.
Received & **Transmitted** columns	
Bytes	The total number of packets in bytes.
Pkts	The total quantity of packets.
Errs	The total quantity of error packets.
Drops	The total quantity of dropped packets.

WAN Service

On this page, you can view the received and transmitted bytes, packets, errors and drops for each WAN interface for your gateway. All WAN interfaces configured for your gateway are included.

In the left menu, click **Device Info** > **Statistics** > **WAN Service**. The Statistics - WAN page appears where you can view detailed information about the status of your WAN.

To reset the counters, click Reset Statistics near the bottom of the page.



Statistics -- WAN

Interface	Description	Received								Transmitted							
		Total				Multicast		Unicast	Broadcast	Total				Multicast		Unicast	Broadcast
		Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts	Bytes	Pkts	Errs	Drops	Bytes	Pkts	Pkts	Pkts
ptm0.1	ipoe_0_1_1	586384	5855	0	0	285661	2104	341	3410	89761	386	0	0	0	0	386	0
eth0.1	ipoe_eth0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The fields on this page are defined below.

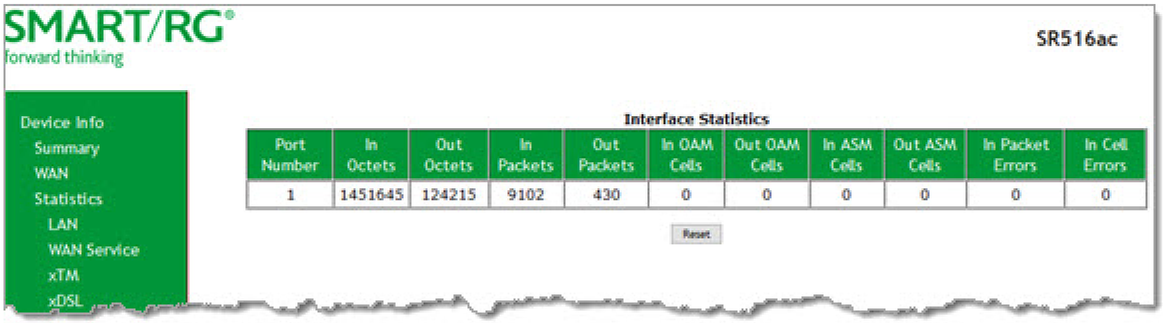
Field Name	Description
Interface	Available WAN interfaces.
Description	The service description. Options are **pppoe**, **ipoe**, and **b**, followed by the identifier for each service.
Received & Transmitted columns	
Bytes	The total number of packets in bytes.
Pkts	The total quantity of packets.
Errs	The total quantity of error packets.
Drops	The total quantity of dropped packets.

xTM

On this page, you can view the ATM/PTM statistics for your gateway. All WAN interfaces configured for your gateway are included.

In the left navigation bar, click Device Info > Statistics > xTM. The Interface Statistics page appears.

To reset these counters, click Reset near the bottom of the page.



Interface Statistics

Port Number	In Octets	Out Octets	In Packets	Out Packets	In OAM Cells	Out OAM Cells	In ASM Cells	Out ASM Cells	In Packet Errors	In Cell Errors
1	1451645	124215	9102	430	0	0	0	0	0	0

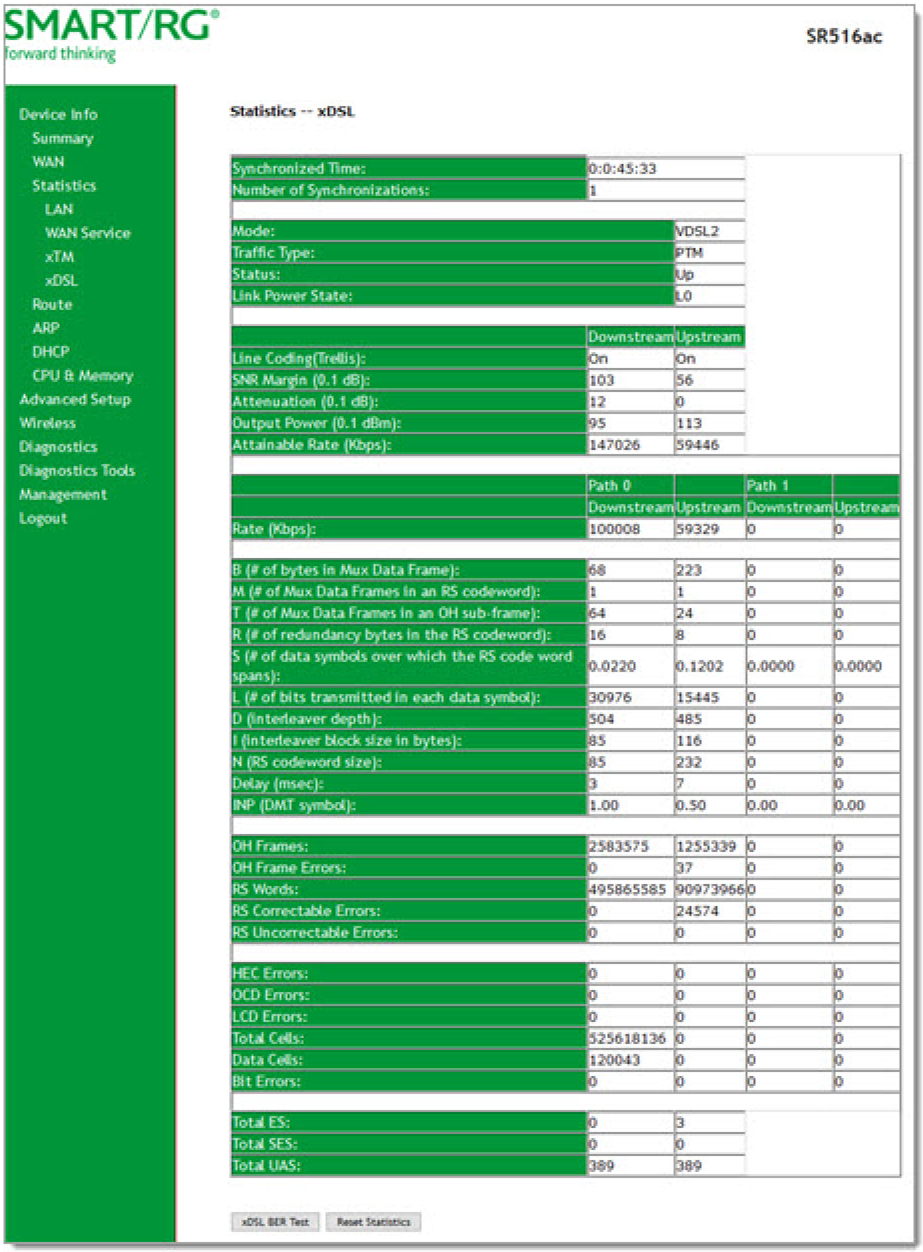
The fields on this page are defined below.

Field Name	Description
Port Number	Statistics for Port 1, or both ports if bonded.
In Octets	Total quantity of received octets.
Out Octets	Total quantity of transmitted octets.
In Packets	Total quantity of received packets.
Out Packets	Total quantity of transmitted packets.
In OAM Cells	Total quantity of received OAM Cells.
Out OAM Cells	Total quantity of transmitted OAM Cells.
In ASM Cells	Total quantity of received ASM Cells.
Out ASM Cells	Total quantity of transmitted ASM Cells.
In Packet Errors	Total quantity of received packet errors.
In Cell Errors	Total quantity of received cell errors.

xDSL

On this page, you can view the DSL statistics for your gateway. All xDSL (VDSL or ADSL) interfaces configured for your gateway are included. The terms and their explanations are derived from the relevant ITU-T standards and referenced accordingly.

1. In the left navigation menu, click **Device Info** > **Statistics** > **xDSL**. The following page appears.



Statistics -- xDSL

Synchronized Time:	0:0:45:33
Number of Synchronizations:	1

Mode:	VDSL2
Traffic Type:	PTM
Status:	Up
Link Power State:	L0

	Downstream	Upstream
Line Coding(Trellis):	On	On
SNR Margin (0.1 dB):	103	56
Attenuation (0.1 dB):	12	0
Output Power (0.1 dBm):	95	113
Attainable Rate (Kbps):	147026	59446

	Path 0		Path 1	
	Downstream	Upstream	Downstream	Upstream
Rate (Kbps):	100008	59329	0	0
B (# of bytes in Mux Data Frame):	68	223	0	0
M (# of Mux Data Frames in an RS codeword):	1	1	0	0
T (# of Mux Data Frames in an OH sub-frame):	64	24	0	0
R (# of redundancy bytes in the RS codeword):	16	8	0	0
S (# of data symbols over which the RS code word spans):	0.0220	0.1202	0.0000	0.0000
L (# of bits transmitted in each data symbol):	30976	15445	0	0
D (interleaver depth):	504	485	0	0
I (interleaver block size in bytes):	85	116	0	0
N (RS codeword size):	85	232	0	0
Delay (msec):	3	7	0	0
INP (DMT symbol):	1.00	0.50	0.00	0.00
OH Frames:	2583575	1255339	0	0
OH Frame Errors:	0	37	0	0
RS Words:	495865585	90973966	0	0
RS Correctable Errors:	0	24574	0	0
RS Uncorrectable Errors:	0	0	0	0
HEC Errors:	0	0	0	0
OCD Errors:	0	0	0	0
LCD Errors:	0	0	0	0
Total Cells:	525618136	0	0	0
Data Cells:	120043	0	0	0
Bit Errors:	0	0	0	0
Total ES:	0	3		
Total SES:	0	0		
Total UAS:	389	389		

2. To run an xDSL (BER) test, follow the instructions in Running xDSL (BER) tests.
3. To reset the counters, click **Reset Statistics** near the bottom of the page.

The fields on this page are defined below.

Field Name	Description
Synchronized Time	Time when the last synchronization was performed.
Number of Synchronizations	Number of synchronizations performed.
Mode	xDSL mode that the modem has trained under, such as VDSL2+, G.DMT, etc.
Traffic Type	Connection type. Options are **ATM**, **PTM** and **ETH**.
Status	Status of the connection. Options are **Up**, **Disabled**, **NoSignal**, and **Initializing**.
Link Power State	Current link power management state (e.g., L0, L2, L3).
Downstream and **Upstream** columns	
Line Coding (Trellis)	State of the Trellis Coded Modulation. Options are **On** and **Off**.
SNR Margin (0.1 db)	Signal-to-noise ration (SNR) margin is the maximum increase (in dB) of the received noise power, such that the modem can still meet all of the target BERs over all the frame bearers. [2]
Attenuation (0.1 db)	Signal attenuation is defined as the difference in dB between the power received at the near-end and that transmitted from the far-end. [2]
Output Power (0.1 dBm)	Transmit power from the gateway to the DSL loop relative to one Milliwatt (dBm).
Attainable Rate (Kbps)	Typical obtainable sync rate, i.e., the attainable net data rate that the receive PMS-TC and PMD functions are designed to support under the following conditions: • Single frame bearer and single latency operation. • Signal-to-Noise Ratio Margin (SNRM) to be equal or above the SNR Target Margin. • BER not to exceed the highest BER configured for one (or more) latency paths. • Latency not to exceed the highest latency configured for one (or more) latency paths. • Accounting for all coding gains available (e.g., trellis coding, RS FEC) with latency bound. • Accounting for the loop characteristics at the instant of measurement. [2]
Rate (Kbps)	Current net data rate of the xDSL link. Net data rate is defined as the sum of all frame bearer data rates over all latency paths. [2]
Downstream and **Upstream** columns **for DSL-specific fields only**	
B (# of bytes in Mux Data Frame)	Nominal number of bytes from frame bearer #n per Mux Data Frame at Reference Point A in the current latency path.
M (# of Mux Data Frames in FEC Data Frame	Number of Mux Data Frames per FEC Data Frame in the current latency path.
T (Mux Data Frames over sync bytes)	Ratio of the number of Mux Data Frames to the number of sync bytes in the current latency path.
R (# of check bytes in FEC Data Frame)	Number of Reed Solomon redundancy bytes per codeword in the current latency path. This is also the number of redundancy bytes per FEC Data Frame in the current latency path.
S (ratio of FEC over PMD Data Frame length)	Ratio of FEC over PMD Data Frame length.

Field Name	Description
L (# of bits in PMD Data Frame)	Number of bits from the latency path included per PMD.
D (interleaver depth)	Interleaving depth in the current latency path.
I (interleaver block size in bytes)	Interleaving block size in the current latency path.
N (RS codeword size)	The number of bits per codeword.
Delay (msec)	PMS-TC delay in milliseconds of the current latency path (or the lowest latency path when running dual-latency paths).
INP (DMT symbol)	Input level for DMT-managed DSL environments.
OH Frames	Number of xDSL OH Frames transmitted/received.
OH Frame Errors	Number of xDSL OH Frames transmitted/received with errors.
(End of DSL-specific field group)	
Super Frames	!!!
Super Frame Errors	!!!
RS Words	Number of Reed-Solomon-based Forward Error Correction (FEC) codewords transmitted/received.
RS Correctable Errors	Number of Reed-Solomon-based FEC codewords received with errors that have been corrected.
RS Uncorrectable Errors	Number of Reed-Solomon-based FEC codewords received with errors that were not correctable.
HEC Errors	Count of ATM HEC errors detected. As per ITU-T G.992.1 and G.992.3, a1-byte HEC is generated for each ATM cell header. Error detection is implemented as defined in ITU-T I.432.1 with the exception that any HEC error shall be considered as a multiple bit error, and therefore, HEC Error Correction is not performed. [1],[2]
OCD Errors	Total number of Out-of-Cell Delineation errors. ATM Cell delineation is the process which allows identification of the cell boundaries. The HEC field is used to achieve cell delineation. [4] An OCD Error is counted when the cell delineation process transitions from the SYNC state to the HUNT state. [2]
LCD Errors	Total number of Loss of Cell Delineation errors. An LCD Error is counted when at least one OCD error is present in each of four consecutive overhead channel periods and SEF (Severely Errored Frame) defect is present. [2]
Total Cells	Total number of cells (OAM and Data cells) transmitted/received.
Data Cells	Total number of data cells transmitted/received.
Bit Errors	Total number of Idle Cell Bit Errors in the ATM Data Path. [3]
Total ES	Total number of Errored Seconds. This parameter is a count of 1-second intervals with one or more CRC-8 anomalies. [4]
Total SES	Total number of Severely Errored Seconds. An SES is declared if, during a 1-second interval, there are 18 or more CRC-8 anomalies in one or more of the received bearer channels, LOS (Loss of Signal)

Field Name	Description
	defects, SEF (Severely Errored Frame) defects, or LPR (Loss of Power) defects. [4]
Total UAS	Total number of Un-Aavailable Seconds. This is a count of 1-second intervals for which the xDSL line is unavailable. The xDSL line becomes unavailable at the onset of 10 contiguous SESs (included in the unavailable time). Once unavailable, the xDSL line becomes available at the onset of 10 contiguous seconds with no SESs (excluded from unavailable time). [4]

References

[1] ITU-T Recommendation G.992.1 (1999), Asymmetric digital subscriber line (ADSL) transceivers

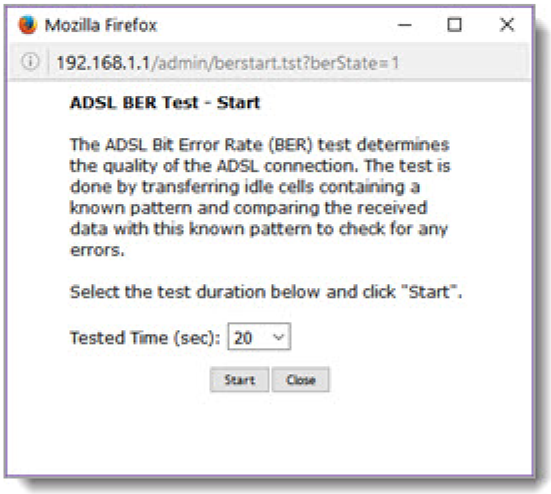
[2] ITU-T Recommendation G.992.3 (2005), Asymmetric digital subscriber line transceivers 2 (ADSL2)

[3] ITU-T Recommendation G.997.1 (2006), Physical layer management for digital subscriber line (DSL) transceivers

[4] ITU-T Recommendation I.432.1 (1999), B-ISDN user-network interface – Physical layer specification: General characteristics

Running xDSL (BER) tests

1. Scroll to the bottom of the page and click **xDSL BER Test**. The ADSL BER Test dialog box appears.



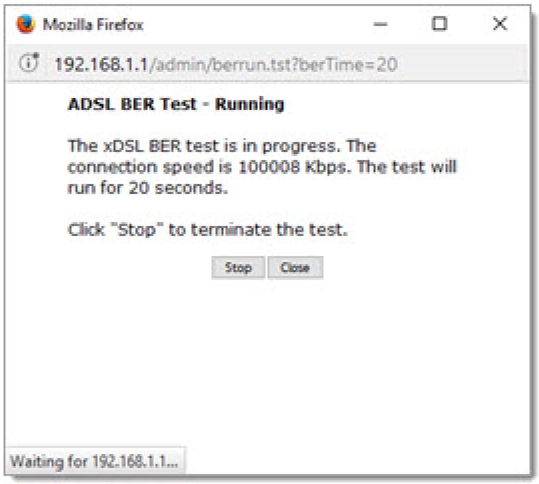
ADSL BER Test - Start

The ADSL Bit Error Rate (BER) test determines the quality of the ADSL connection. The test is done by transferring idle cells containing a known pattern and comparing the received data with this known pattern to check for any errors.

Select the test duration below and click "Start".

Tested Time (sec): 20

2. In the **Tested Time** field, select the duration in seconds and click **Start**. Options range from **1 second** to **360 seconds.** The test transfers idle cells containing a known pattern and compares the received data with this known pattern. Comparison errors are tabulated and displayed. To stop the test, click **Stop**.

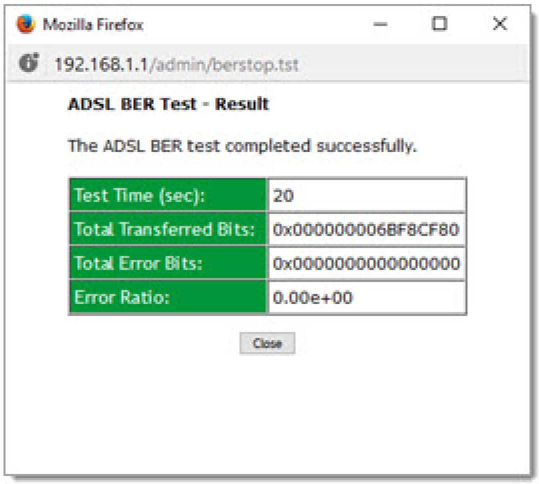

Mozilla Firefox
192.168.1.1/admin/berrun.tst?berTime=20
Stop
Close
Waiting for 192.168.1.1...

ADSL BER Test - Running

The xDSL BER test is in progress. The connection speed is 100008 Kbps. The test will run for 20 seconds.

Click "Stop" to terminate the test.

3. When the test completes, a success dialog box appears.
   Note: If the Error Ratio reaches e-5, you cannot access the Internet.



ADSL BER Test - Result

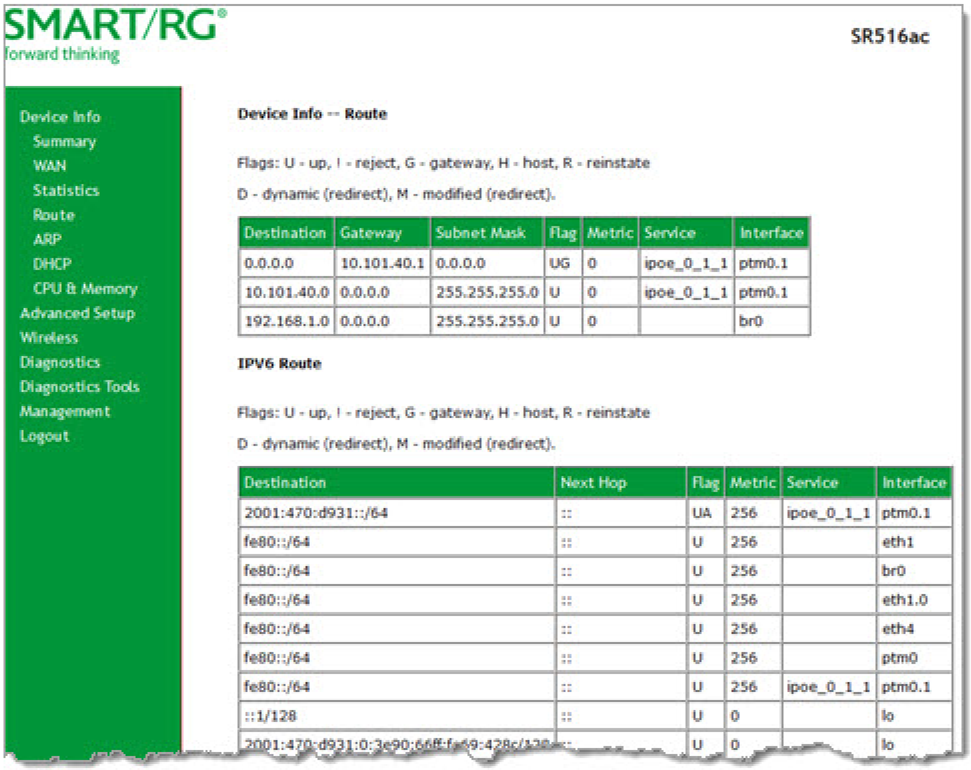
The ADSL BER test completed successfully.

Test Time (sec):	20
Total Transferred Bits:	0x000000006BF8CF80
Total Error Bits:	0x0000000000000000
Error Ratio:	0.00e+00

Route

On this page, you can view the LAN and WAN route table information configured in your gateway for both IPv4 and IPv6 implementation.

In the left navigation bar, click Device Info > Route. The following page appears.



Device Info -- Route

Flags: U - up, ! - reject, G - gateway, H - host, R - reinstate

D - dynamic (redirect), M - modified (redirect).

Destination	Gateway	Subnet Mask	Flag	Metric	Service	Interface
0.0.0.0	10.101.40.1	0.0.0.0	UG	0	ipoe_0_1_1	ptm0.1
10.101.40.0	0.0.0.0	255.255.255.0	U	0	ipoe_0_1_1	ptm0.1
192.168.1.0	0.0.0.0	255.255.255.0	U	0		br0

IPV6 Route

Flags: U - up, ! - reject, G - gateway, H - host, R - reinstate

D - dynamic (redirect), M - modified (redirect).

Destination	Next Hop	Flag	Metric	Service	Interface
2001:470:d931::/64	::	UA	256	ipoe_0_1_1	ptm0.1
fe80::/64	::	U	256		eth1
fe80::/64	::	U	256		br0
fe80::/64	::	U	256		eth1.0
fe80::/64	::	U	256		eth4
fe80::/64	::	U	256		ptm0
fe80::/64	::	U	256	ipoe_0_1_1	ptm0.1
::1/128	::	U	0		lo
2001:470:d931:0:3e90:66ff:fe69:428c/128	::	U	0		lo

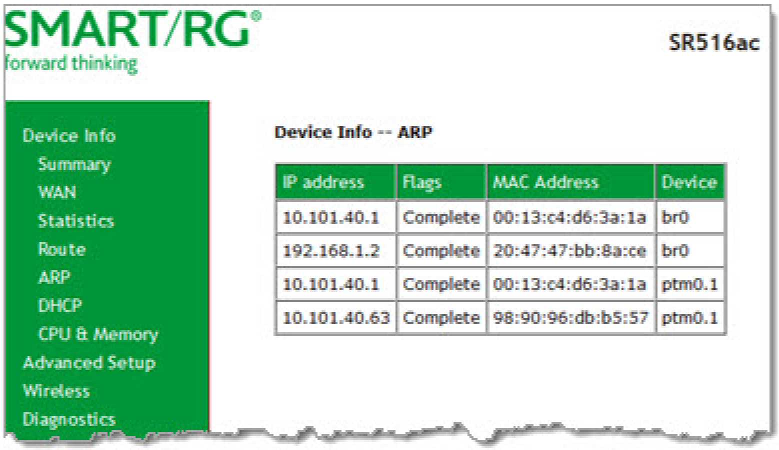
The fields on this page are defined below.

Field Name	Description
Destination	Destination IP addresses.
Gateway	(*For IPv4 only*) Gateway IP address.
Subnet Mask	(*For IPv4 only*) Subnet Mask.
Next Hop	(*For IPv6 only*) Identifies the next server in the IPv6 path, if any.
Flag	Status of the flags.
Metric	Number of hops to reach the default gateway.
Service	Service type.
Interface	WAN/LAN interface.

ARP

On this page, you can view the MAC address and IP address information for the devices connected to the gateway.

In the left navigation bar, click **Device Info** > **ARP**. The following page appears.



Device Info -- ARP

IP address	Flags	MAC Address	Device
10.101.40.1	Complete	00:13:c4:d6:3a:1a	br0
192.168.1.2	Complete	20:47:47:bb:8a:ce	br0
10.101.40.1	Complete	00:13:c4:d6:3a:1a	ptm0.1
10.101.40.63	Complete	98:90:96:db:b5:57	ptm0.1

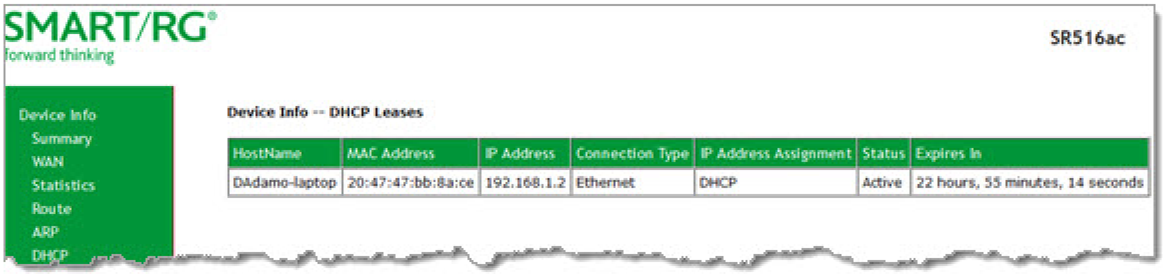
The fields on this page are defined below.

Field Name	Description
IP address	IP address of the host.
Flags	Each entry in the ARP cache is marked with a status flag. Options are **Complete**, **Permanent**, and **Published**.
MAC Address	MAC address of the host.
Device	System level interface by which the host is connected. Options are: **br(#)**, **atm(#)**, **eth(#)**, and **ptm(#)**.

DHCP

On this page, you can view the host name, the IP address assigned by the DHCP server, the MAC address corresponding to the IP address, and the DHCP lease time.

In the left navigation bar, select **Device Info** > **DHCP**. The following screen appears.



Device Info -- DHCP Leases

HostName	MAC Address	IP Address	Connection Type	IP Address Assignment	Status	Expires In
DAdamo-laptop	20:47:47:bb:8a:ce	192.168.1.2	Ethernet	DHCP	Active	22 hours, 55 minutes, 14 seconds

The fields on this page are defined below.

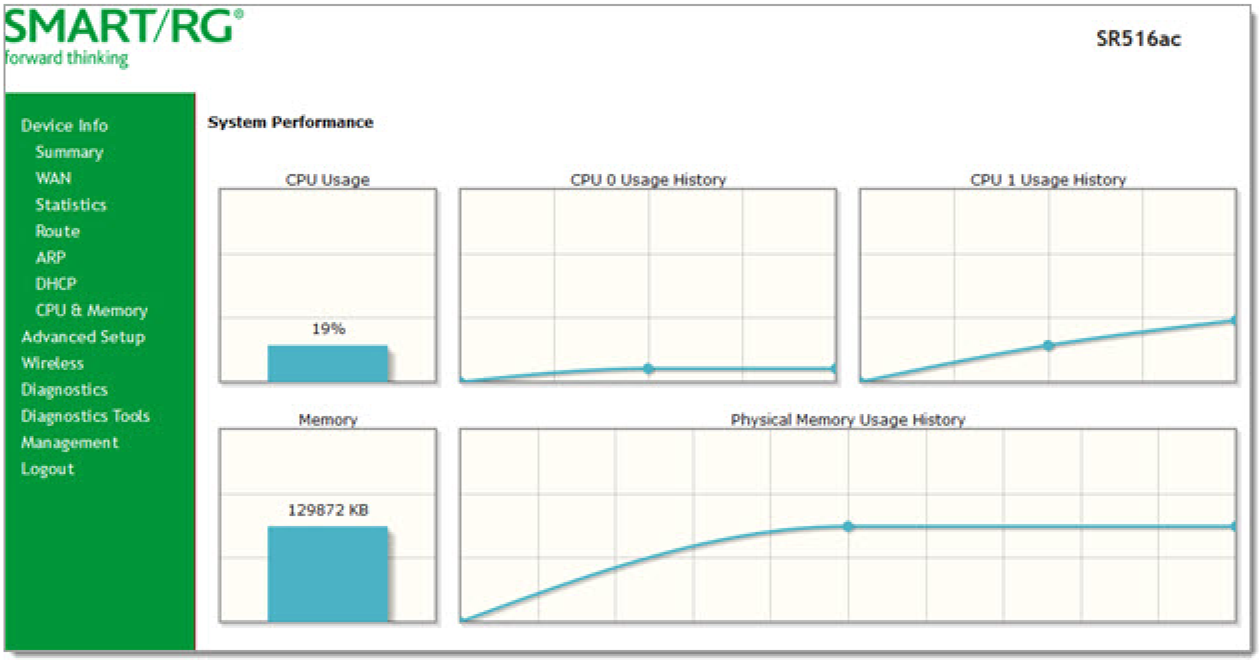
Field Name	Description
Hostname	Host name of each connected LAN device.
MAC Address	MAC address for each connected LAN device.

Field Name	Description
IP Address	IP address for each connected LAN device.
Connection Type	Type of connection for each LAN devices, such as **Ethernet**.
IP Address Assignment	Type of IP address assignment, such as **DHCP**.
Status	Status of the connection. Options are **Active** and **Inactive**.
Expires In	Time until the DHCP lease expires for each LAN device.

CPU & Memory

On this page, you can view the CPU and memory data for the gateway.

In the left navigation bar, click **Device Info** > **CPU & Memory**. The following page appears, showing the current usage and history. The information refreshes automatically.



Advanced Setup

In this section, you can configure network interfaces, UPnP, quality of service, and other features.

Layer2 Interface

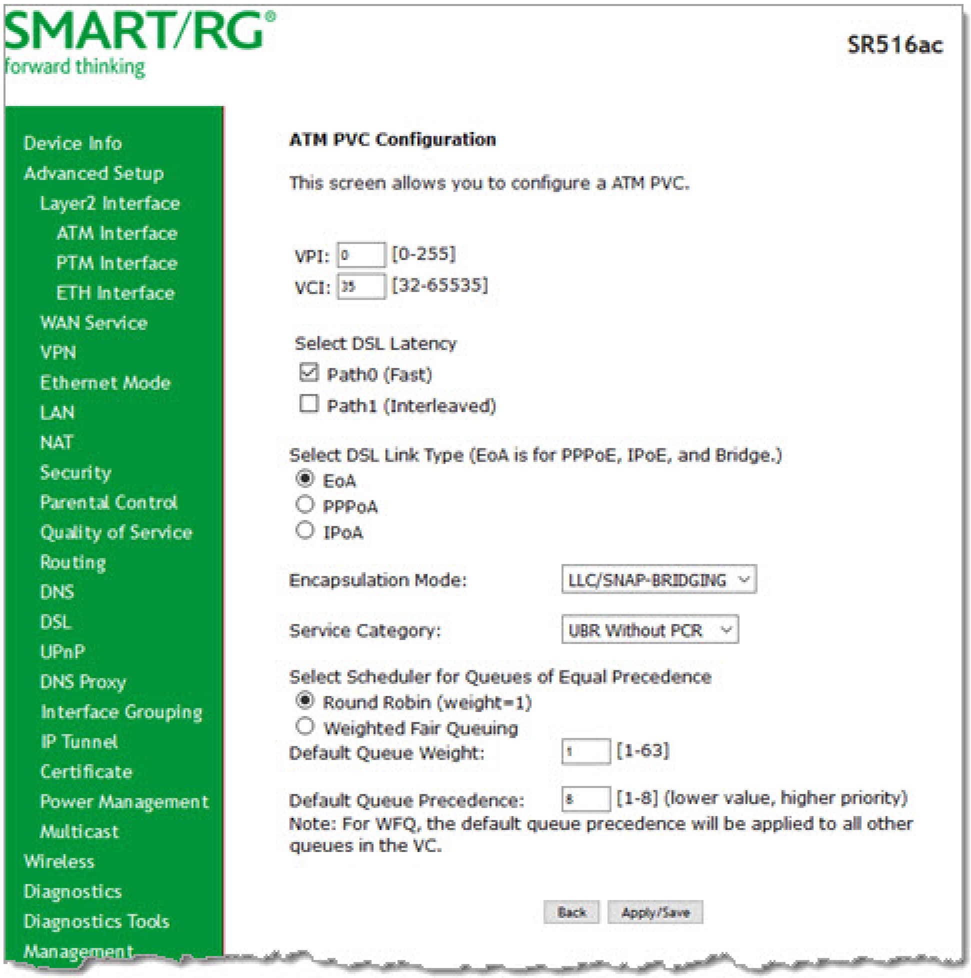
In this section, you can configure the network interfaces for your gateway.

ATM Interface

On this page, you can configure Asynchronous Transfer Mode / Permanent Virtual Circuit (ATM/PVC) settings for your gateway. You can customize latency options, link type, encapsulation mode and more.

Note: Devices (gateways) on both ends of the connection must support ATM / PVC.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **ATM Interface** and then click **Add**. The following page appears.



ATM PVC Configuration

This screen allows you to configure a ATM PVC.

VPI: 0 [0-255]
VCI: 35 [32-65535]

Select DSL Latency
☑ Path0 (Fast)
□ Path1 (Interleaved)

Select DSL Link Type (EoA is for PPPoE, IPoE, and Bridge.)
● EoA
○ PPPoA
○ IPoA

Encapsulation Mode: LLC/SNAP-BRIDGING

Service Category: UBR Without PCR

Select Scheduler for Queues of Equal Precedence
● Round Robin (weight=1)
○ Weighted Fair Queuing
Default Queue Weight: 1 [1-63]

Default Queue Precedence: 8 [1-8] (lower value, higher priority)
Note: For WFQ, the default queue precedence will be applied to all other queues in the VC.

2. Modify the settings as needed, using the information in the table below.
3. Click Apply/Save to commit your changes. The new interface appears on the DSL ATM Interface Configuration page.
4. To remove an interface, click the Remove checkbox next to it and then click the Remove button.

The fields on this page are defined below.

Field Name	Description
VPI	Enter a Virtual Path Identifier. A VPI is an 8-bit identifier that uniquely identifies a network path for ATM cell packets to reach its destination. A unique VPI number is required for each ATM path. This setting works with the VCI. Each individual DSL circuit must have a unique VPI/VCI combination. Options are **0-255**. The default is **zero** (**0**).
VCI	Enter a Virtual Channel Identifier. A VCI is a 16-bit identifier for a unique channel. Options are **32-65535**. The default is **35**. **Note**: **1-31** are reserved for known protocols.

Field Name	Description
Select DSL Latency	Select the level of DSL latency. Options are: • **Path0 (Fast)**: No error correction and can provide lower latency on error-free lines. This is the default. • **Path1 (Interleaved)**: Error checking that provides error-free data which increases latency.
Select DSL Link Type	Select the linking protocol. Options are: • **EoA:** Ethernet over ATM, used for PPPoE, IPoE, and Bridge. This is the default. • **PPPoA:** Point-to-Point Protocol over ATM. • **IPoA:** Internet Protocol over ATM.
Encapsulation Mode	Select whether multiple protocols or only one protocol is carried per PVC (Permanent Virtual Circuit). Options are: • **LLC/ENCAPSULATION**: (*Available for PPPoA only*) Logical Link Control (LLC) encapsulation protocols used with multiple PVCs • **LLC/SNAP-BRIDGING:** (*Available for EoA only*) Logical Link Control used to carry multiple protocols in a single PVC. • **LLC/SNAP-ROUTING**: (*Available for IPoA only*) LLC used to carry one protocol per PVC. • **VC/MUX:** Virtual Circuit/Multiplexer creates a virtual connection used to carry one protocol per PVC.
Service Category	Select the bit rate protocol. Options are: • **UBR without PCR:** Unspecified Bit Rate with no Peak Cell Rate, flow control or time synchronization between the traffic source and destination. Commonly used with applications that can tolerate data / packet loss. • **UBR with PCR:** Same as above but with a Peak Cell Rate. • **CBR:** Constant Bit Rate relies on timing synchronization to make the network traffic predictable. Used commonly in Video and Audio traffic network applications. • **Non Realtime VBR:** Non Realtime Variable Bit Rate used for connections that transport traffic at a variable rate. This category requires a guaranteed bandwidth and latency. It does not rely on timing synchronization between the destination and source. • **Realtime VBR:** Realtime Variable Bit Rate. Same as the above option but relies on timing and synchronization between the destination and source. This category is commonly used in networks with compressed video traffic.
Select Scheduler for Queues of Equal Precedence as the Default Queue	Select the algorithm used to schedule queue behavior. VC scheduling is different than scheduling done for default queues. Options are: • **Round Robin (weight=1)**: Packets are accessed in a round robin style. Classes can be assigned. Time slices are assigned to each process in equal portions and in circular order, handling all processes without priority (also known as cyclic executive). This is the default. • **Weighted Fair Queuing**: Packets are assigned in a specific queue. This data packet scheduling technique allows different scheduling priorities to be assigned to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (that sent larger packets or

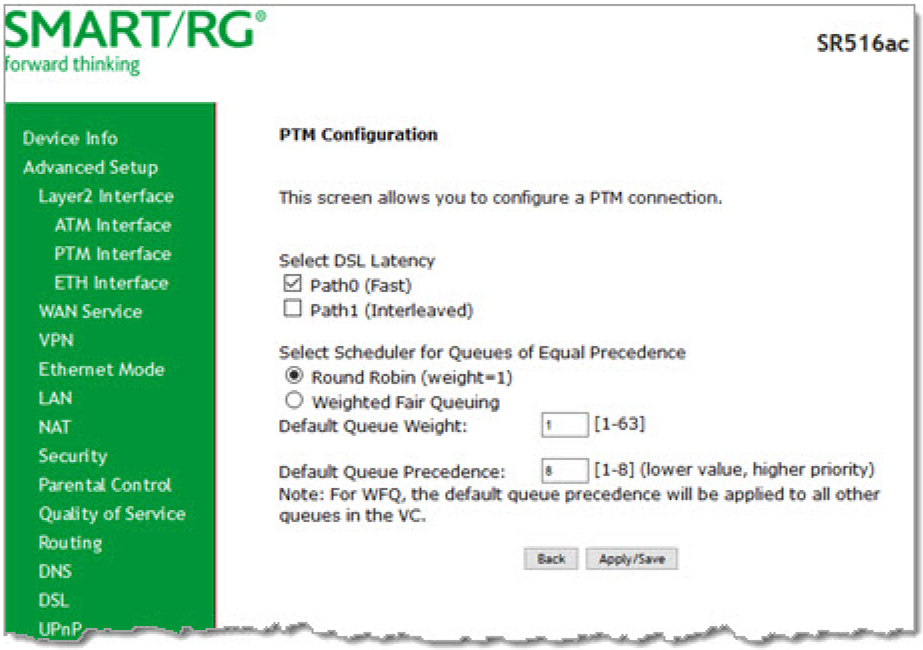
Field Name	Description
	more packets per second than the others since it became active) will only affect itself and not other sessions.
Default Queue Weight	Enter the default weight of the specified queue. Options are **1**-**63**. The default is **1**.
Default Queue Precedence	Enter the precedence of the specified group. The lower the value, the higher the priority. Options are **1**-**8**. The default is **8**.

PTM Interface

SmartRG gateway follow VDSL2 standards to support Packet Transfer Mode (PTM). An alternative to ATM mode, PTM transports packets (IP, PPP, Ethernet, MPLS, and others) over DSL links. For more information, refer to the IEEE802.3ah standard for Ethernet in the First Mile (EFM).

On this page, you can configure PTM WAN interfaces.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **PTM Interface**, and then click **Add**. The following page appears.



PTM Configuration

This screen allows you to configure a PTM connection.

Select DSL Latency
☑ Path0 (Fast)
□ Path1 (Interleaved)

Select Scheduler for Queues of Equal Precedence
● Round Robin (weight=1)
○ Weighted Fair Queuing
Default Queue Weight: 1 [1-63]

Default Queue Precedence: 8 [1-8] (lower value, higher priority)
Note: For WFQ, the default queue precedence will be applied to all other queues in the VC.

2. Modify the settings as desired, using the information in the table below.
3. Click **Apply/Save** to commit your changes. The new interface appears on the PTM Configuration page.
4. To remove an interface, click the **Remove** checkbox next to it and then click the **Remove** button.

The fields on this page are defined below.

Field Name	Description
Select DSL Latency	Select the level of DSL latency. Options are: • **Path0 (Fast):** No error correction and can provide lower latency on error-free lines. This is the default. • **Path1 (Interleaved):** Error checking that provides error-free data which increases latency.
Select Scheduler for Queues of Equal Precedence as the Default Queue	Select the algorithm used to schedule queue behavior. VC scheduling is different than scheduling done for default queues. Options are: • **Round Robin (weight=1):** Packets are accessed in a round robin style and classes can be assigned. Time slices are assigned to each process in equal portions and in circular order, handling all processes without priority (also known as cyclic executive). This is the default. • **Weighted Fair Queuing**: Packets are assigned in a specific queue. This data packet scheduling technique allows different scheduling priorities to be assigned to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (that sent larger packets or more packets per second than the others since it became active) will only affect itself and not other sessions.
Default Queue Weight	Enter the default weight of the specified queue. Options are **1**-**63**. The default is **1**.
Default Queue Precedence	Enter the precedence of the specified group. The lower the value, the higher the priority. Options are **1**-**8**. The default is **8**.

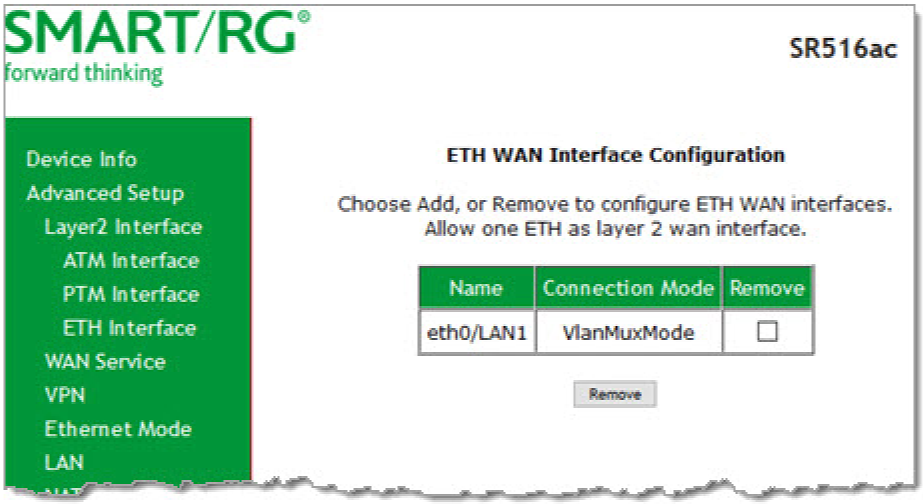
ETH Interface

On this page, you can configure ETH WAN interfaces. One of the four LAN ports on your gateway can be re-purposed to become an RJ45 WAN port when needed.

Notes:

- Only one Ethernet WAN interface is allowed. If a WAN port it is already configured, you must remove it before you can define a new one. Click the **Remove** checkbox and then click the **Remove** button. The **Add** button appears when the existing port is removed.
- If a WAN port is already configured and associated with a WAN service, you must remove the WAN service configuration before you can remove the port on this page.

1. In the left navigation bar, click **Advanced Setup** > **Layer2 Interface** > **ETH Interface**. The following page appears.

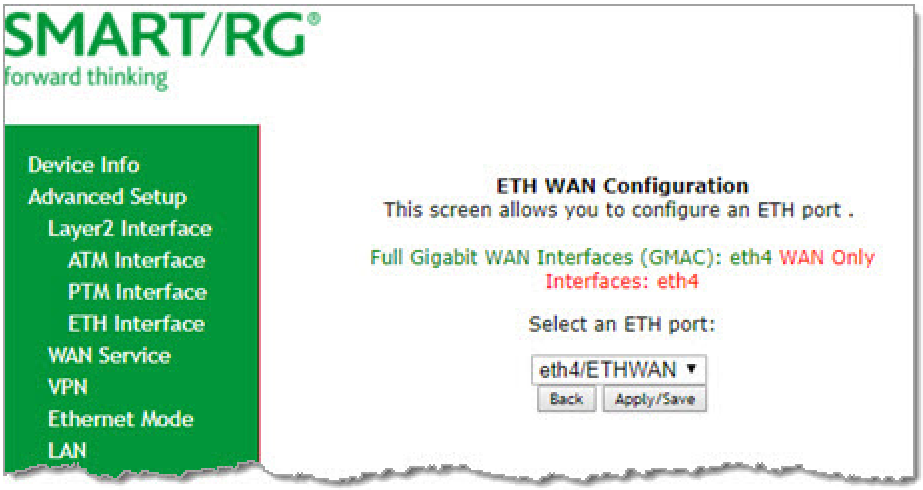


ETH WAN Interface Configuration

Choose Add, or Remove to configure ETH WAN interfaces.
Allow one ETH as layer 2 wan interface.

Name	Connection Mode	Remove
eth0/LAN1	VlanMuxMode	□

2. To remove an entry, click the **Remove** checkbox next to the entry and then click the **Remove** button.
3. To add an entry, click **Add**. The following page appears.



ETH WAN Configuration
This screen allows you to configure an ETH port .

Full Gigabit WAN Interfaces (GMAC): eth4 WAN Only Interfaces: eth4

Select an ETH port:

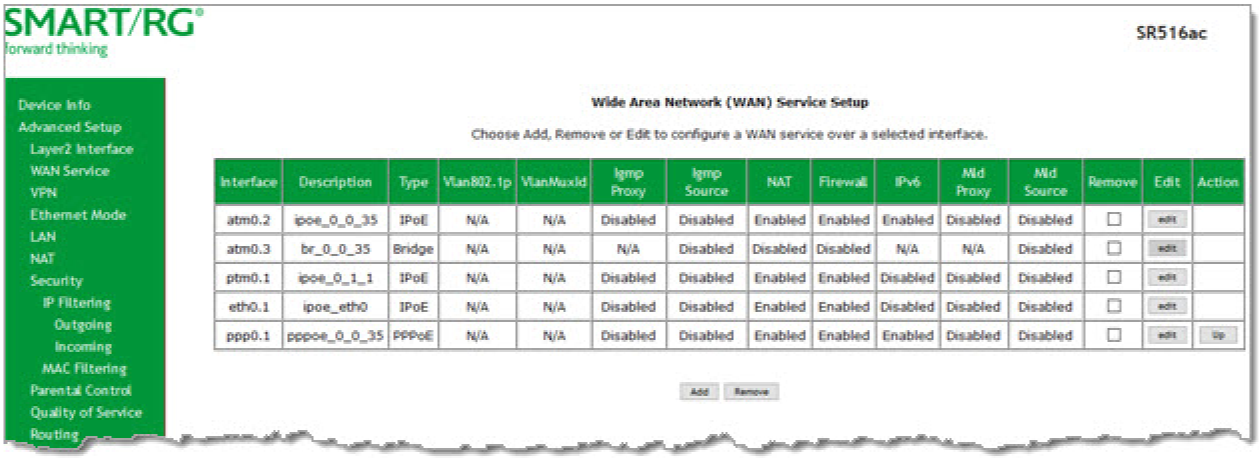
eth4/ETHWAN ▾

4. Select the LAN port you want to use as a WAN port.
5. Click **Apply/Save** to commit your changes. The interface is added to the ETH WAN Interface Configuration page.

WAN Service

On this page, you can add, remove, or edit a WAN service. You must configure the related interface (ATM, ETH or PTM) first. You can configure services for PPPoE, IPoE, and Bridging. A sample configuration scenario is provided for each variation.

1. In the left navigation, click **Advanced Setup** > **WAN Service**. The following page appears, showing any services already configured.



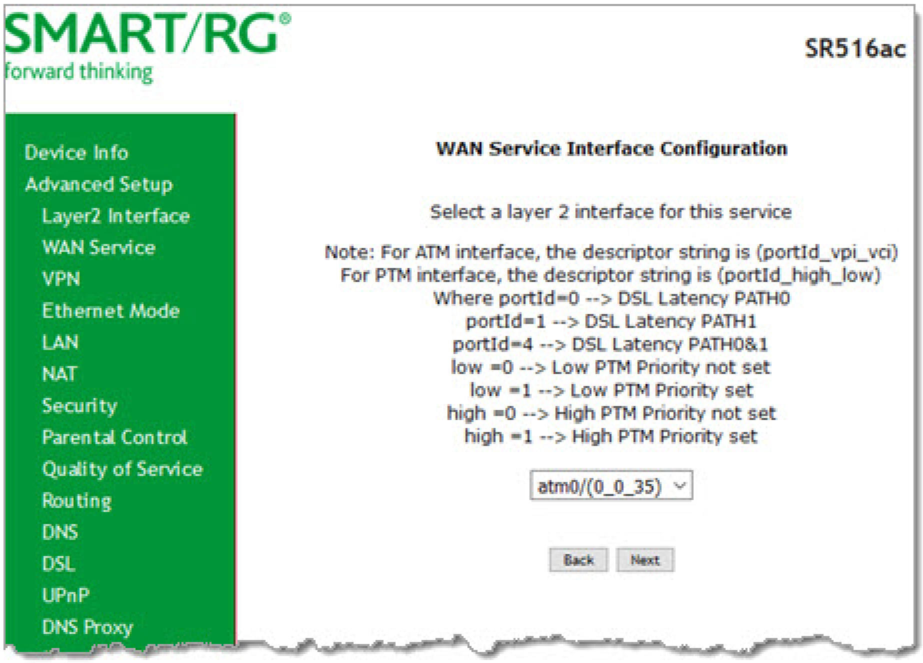
Wide Area Network (WAN) Service Setup

Choose Add, Remove or Edit to configure a WAN service over a selected interface.

Interface	Description	Type	Vlan802.1p	VlanMuxId	Igmp Proxy	Igmp Source	NAT	Firewall	IPv6	Mld Proxy	Mld Source	Remove	Edit	Action
atm0.2	ipoe_0_0_35	IPoE	N/A	N/A	Disabled	Disabled	Enabled	Enabled	Enabled	Disabled	Disabled	□	edit	
atm0.3	br_0_0_35	Bridge	N/A	N/A	N/A	Disabled	Disabled	Disabled	N/A	N/A	Disabled	□	edit	
ptm0.1	ipoe_0_1_1	IPoE	N/A	N/A	Disabled	Disabled	Enabled	Enabled	Disabled	Disabled	Disabled	□	edit	
eth0.1	ipoe_eth0	IPoE	N/A	N/A	Disabled	Disabled	Enabled	Enabled	Disabled	Disabled	Disabled	□	edit	
ppp0.1	pppoe_0_0_35	PPPoE	N/A	N/A	Disabled	Disabled	Enabled	Enabled	Enabled	Disabled	Disabled	□	edit	Up

Add Remove

2. To add a service, click **Add**. The following page appears.



WAN Service Interface Configuration

Select a layer 2 interface for this service

Note: For ATM interface, the descriptor string is (portId_vpi_vci)
For PTM interface, the descriptor string is (portId_high_low)
Where portId=0 --> DSL Latency PATH0
portId=1 --> DSL Latency PATH1
portId=4 --> DSL Latency PATH0&1
low =0 --> Low PTM Priority not set
low =1 --> Low PTM Priority set
high =0 --> High PTM Priority not set
high =1 --> High PTM Priority set

atm0/(0_0_35)

Back Next

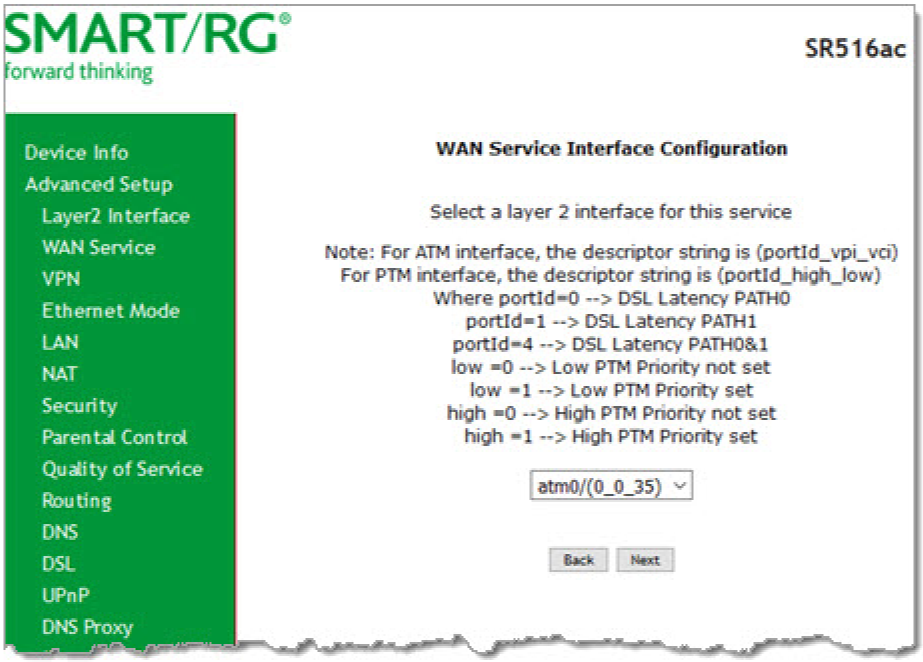
3. Modify the settings as desired, using the information in the topics listed below:
   - PPP over Ethernet WAN Service
   - IP over Ethernet WAN Service
   - Bridging
4. To edit an interface:
   a. Click the **Edit** button at the far right.
   b. Modify the settings as needed and then click through to click **Apply/Save**.
5. To remove an interface, click the **Remove** checkbox next to it and then click the **Remove** button.

PPP over Ethernet WAN Service

There are several parts to configuring a PPP over Ethernet (PPPoE) WAN service. You will progress through several pages to complete the configuration.

Note: You can configure 7 services. If 7 services are configured, you must remove 1 of the services before configuring a new one.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



WAN Service Interface Configuration

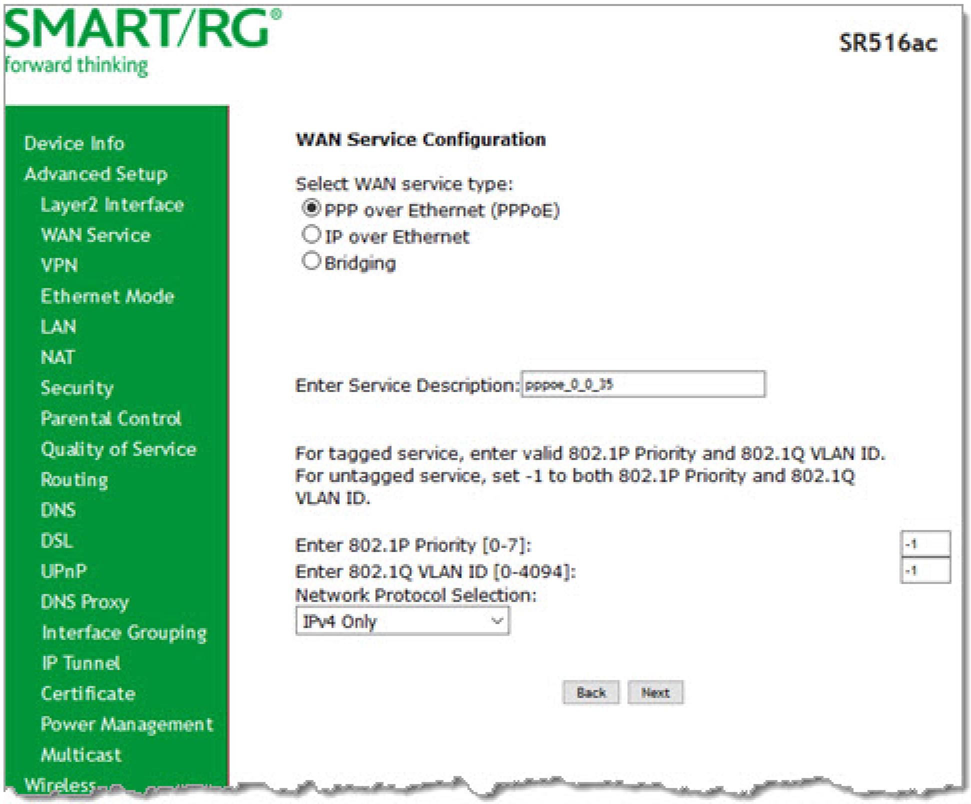
Select a layer 2 interface for this service

Note: For ATM interface, the descriptor string is (portId_vpi_vci)
For PTM interface, the descriptor string is (portId_high_low)
Where portId=0 --> DSL Latency PATH0
portId=1 --> DSL Latency PATH1
portId=4 --> DSL Latency PATH0&1
low =0 --> Low PTM Priority not set
low =1 --> Low PTM Priority set
high =0 --> High PTM Priority not set
high =1 --> High PTM Priority set

atm0/(0_0_35)

2. Select the Layer 2 interface to use for the WAN service.

3. Click **Next**. The following page appears.



WAN Service Configuration

Select WAN service type:

● PPP over Ethernet (PPPoE)
○ IP over Ethernet
○ Bridging

Enter Service Description: pppoe_0_0_35

For tagged service, enter valid 802.1P Priority and 802.1Q VLAN ID.
For untagged service, set -1 to both 802.1P Priority and 802.1Q VLAN ID.

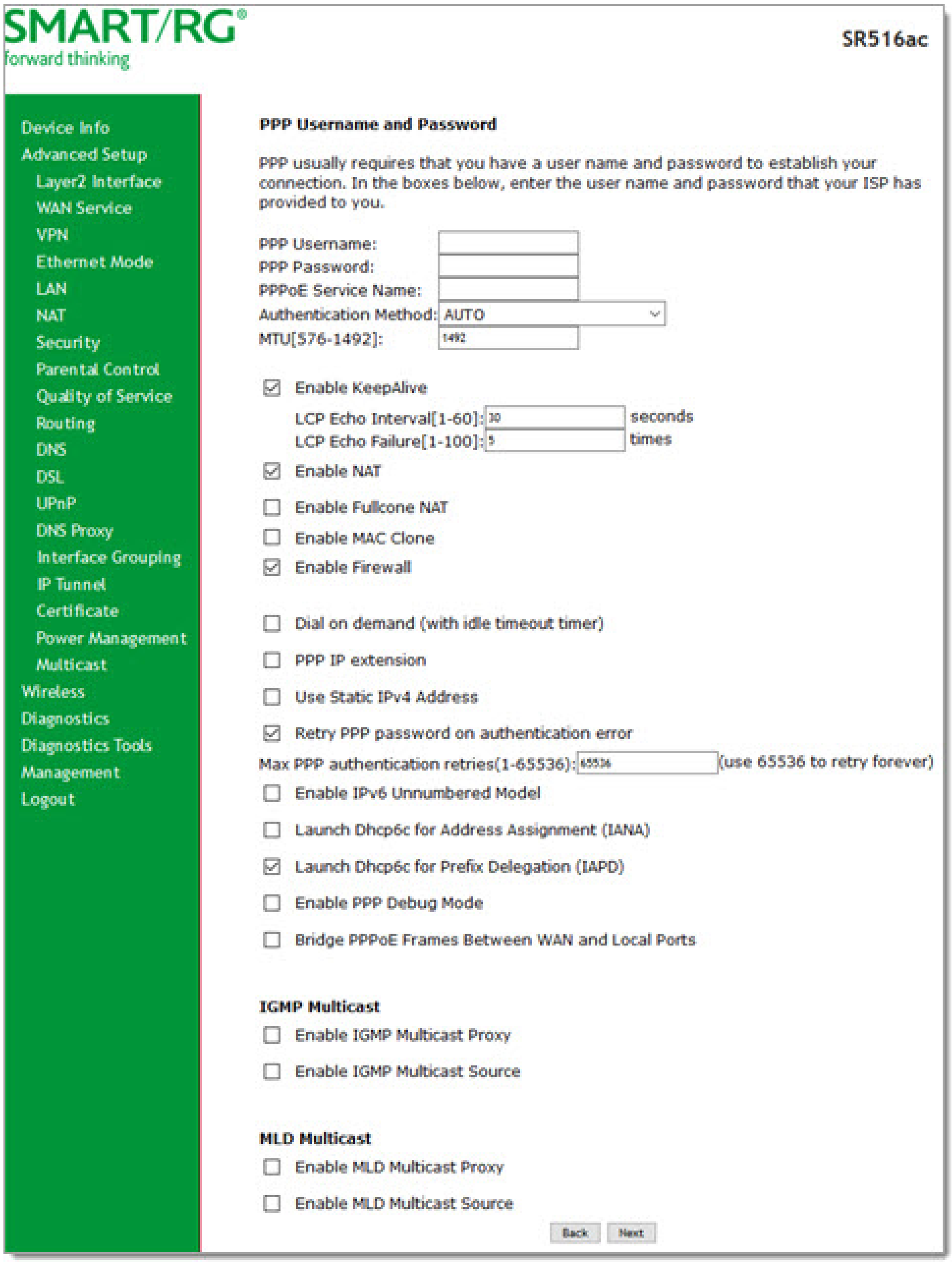
Enter 802.1P Priority [0-7]: -1
Enter 802.1Q VLAN ID [0-4094]: -1
Network Protocol Selection:
IPv4 Only

4. In the **WAN Service Type** field, accept the default of **PPP over Ethernet (PPPoE)**.
5. (*Optional*) Modify the other fields, using the information in the following table.

Field Name	Description
Enter Service Description	(*Optional*) Enter a name to describe this configuration.
Enter 802.1P Priority	Enter the priority for this service. Options are **0** - **7**. The default is **0**. For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, accept the defaults of **-1** (disabled) in this field and the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Enter the VLAN ID for this service. Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, accept the defaults of**-1** (disabled) in this field and the **802.1P Priority** field.

Field Name	Description
Network Protocol Selection	Different scheduling priorities can be applied to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (which has sent larger packets or more packets per second than the others) will only punish itself and not other sessions. Options are **IPv4 Only**, **IPv4&IPv6** (Dual Stack), and **IPv6 Only**. **Note:** When you select **IPV4&IPV6** or **IPV6**, the options presented on later pages change accordingly.

6. Click **Next**. The following page appears where you will configure the PPP Username, Password and related information.



PPP Username and Password

PPP usually requires that you have a user name and password to establish your connection. In the boxes below, enter the user name and password that your ISP has provided to you.

PPP Username:
PPP Password:
PPPoE Service Name:
Authentication Method: AUTO
MTU[576-1492]: 1492

☑ Enable KeepAlive

LCP Echo Interval[1-60]: 30 seconds
LCP Echo Failure[1-100]: 5 times

☑ Enable NAT

☐ Enable Fullcone NAT

☐ Enable MAC Clone

☑ Enable Firewall

☐ Dial on demand (with idle timeout timer)

☐ PPP IP extension

☐ Use Static IPv4 Address

☑ Retry PPP password on authentication error

Max PPP authentication retries(1-65536): 65536 (use 65536 to retry forever)

☐ Enable IPv6 Unnumbered Model

☐ Launch Dhcp6c for Address Assignment (IANA)

☑ Launch Dhcp6c for Prefix Delegation (IAPD)

☐ Enable PPP Debug Mode

☐ Bridge PPPoE Frames Between WAN and Local Ports

IGMP Multicast

☐ Enable IGMP Multicast Proxy

☐ Enable IGMP Multicast Source

MLD Multicast

☐ Enable MLD Multicast Proxy

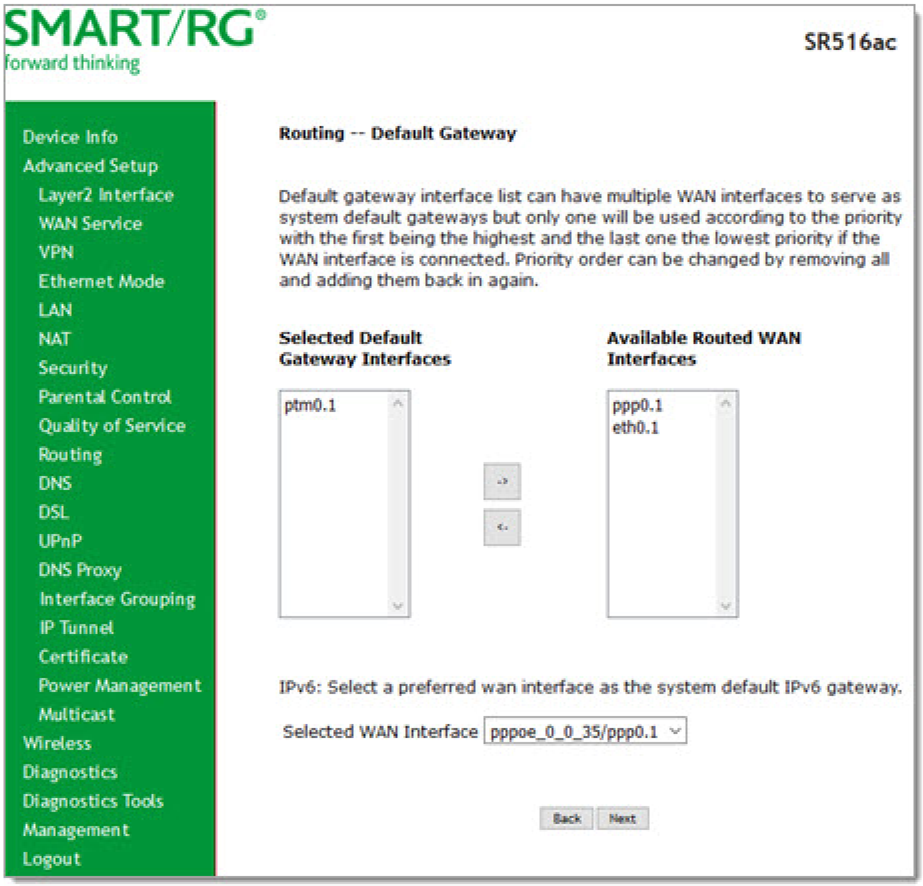
☐ Enable MLD Multicast Source

7. Modify the fields as needed, using the information in the table provided below.

Field Name	Description
PPP Username	Enter the username required for authentication to the PPP server.
PPP Password	Enter the password required for authentication to the PPP server.
PPPoE Service Name	(*Optional*) Enter a description for this service.
Authentication Method	Select a means for authentication. Options are: - **AUTO**: Attempt to automatically detect the handshake protocol (listed below). - **PAP**: Password Authentication Protocol (plaintext passwords). - **CHAP**: Challenge Handshake Authentication Protocol. (MD5 hashing scheme on passwords). - **MSCHAP**: Microsoft Challenge Handshake Authentication Protocol. (Microsoft encrypted password authentication protocol).
MTU [576-1492]	Enter the MTU (Maximum Transmission Unit) size. Options are **576** - **1492 bytes**. The default is **1492** bytes.
Enable KeepAlive	This option is enabled by default. To *disable* keepalive packets, clear the checkbox. Enter values in the following fields: - **LCP Echo Interval [1-60]**: Enter the interval for sending echos in seconds. The default is **30** seconds. - **LCP Echo Failure [1-100]:** Enter the number of times that echos should be sent before reporting echo failure. The default is **5** times.
Enable NAT	This option is enabled by default. To *disable* NAT (Network Address Translation), clear the checkbox.
Enable Fullcone NAT	Click to enable "one-to-one" NAT. All requests from the same internal IP address and port are mapped to the same external IP address and port. In addition, any external host can send a packet to the internal host by sending a packet to the mapped external address. Warning: Enabling this option will disable network acceleration and some security settings.
Enable MAC Clone	Click to enable MAC cloning. Additional fields appear. Options are: - Enter the MAC address that you want to clone. - To use the MAC address of the connected PC, click **Clone the PC MAC Address**.
Enable Firewall	This option is enabled by default. To *disable* the firewall, clear the checkbox.
Dial on Demand	Click to enable dialing on-demand. The **Inactivity Timeout (minutes)** field appears. Enter the of minutes before a session is timed out. Options are **1** - **4320**. The default is zero (**0**). When this option is enabled, connection automatically starts when there is outbound traffic to the Internet. It automatically terminates if the connection is idle, based on the value in the **Idle Timeout** setting.
PPP IP extension	Click to forward all traffic to the specified DMZ IP. When you select this option, the **NAT** and **Firewall** fields are hidden.

Field Name	Description
Use Static IPv4 Address	Click to use the IPv4 Address associated with this WAN service. The **IPv4 Address** field appears. Enter the static IPv4 address for this WAN service.
Retry PPP password on authentication error	This option is enabled by default. In the **Max PPP authentication retries (1-65536)** field, enter the number of tries allowed. The default is **65536** (unlimited tries). To *prevent* retrying the PPP password after authentication errors, clear the checkbox.
Enable IPv6 Unnumbered Model	*(Available only for IPv6 environments*) Click to enable IP processing on a serial interface without assigning it an explicit IP address. The IP address of another interface can "borrow" the IP address of another interface already configured on the router, which conserves network and address space.
Launch Dhcp6c for Address Assignment (IANA)	*(Available only for IPv6 environments*) Click to enable the gateway to receive the WAN IP from the ISP.
Launch Dhcp6c for Prefix Delegation (IAPD)	(*Available only for IPv6 environments*) This option is enabled by default and enables the gateway to generate the WAN IP's prefix from the server's REST by MAC address. To disable this options, clear the checkbox.
Enable PPP Debug Mode	Click to have the system put more PPP connection information into the system log of the device. This is for debugging errors and not for normal usage.
Bridge PPPoE Frames Between WAN and Local Ports	Select to enable PPPoE passthrough to relay PPPoE connections from behind the modem. Also known as Half-Bridged mode.
Enable IGMP Multicast Proxy	Click to enable Internet Group Membership Protocol (IGMP) multicast. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable IGMP Multicast Source	Click to enable this service to act as an IGMP multicast source.
Enable MLD Multicast Proxy	(*Available only for IPv6 environments*) Click to enable MLD multicast. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable MLD Multicast Source	(*Available only for IPv6 environments*) Click to enable this service to act as an MLD multicast source.

8. Click **Next**. The following page appears where you will select the interface used as a default gateway used for the PPP service being created.



Routing -- Default Gateway

Default gateway interface list can have multiple WAN interfaces to serve as system default gateways but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

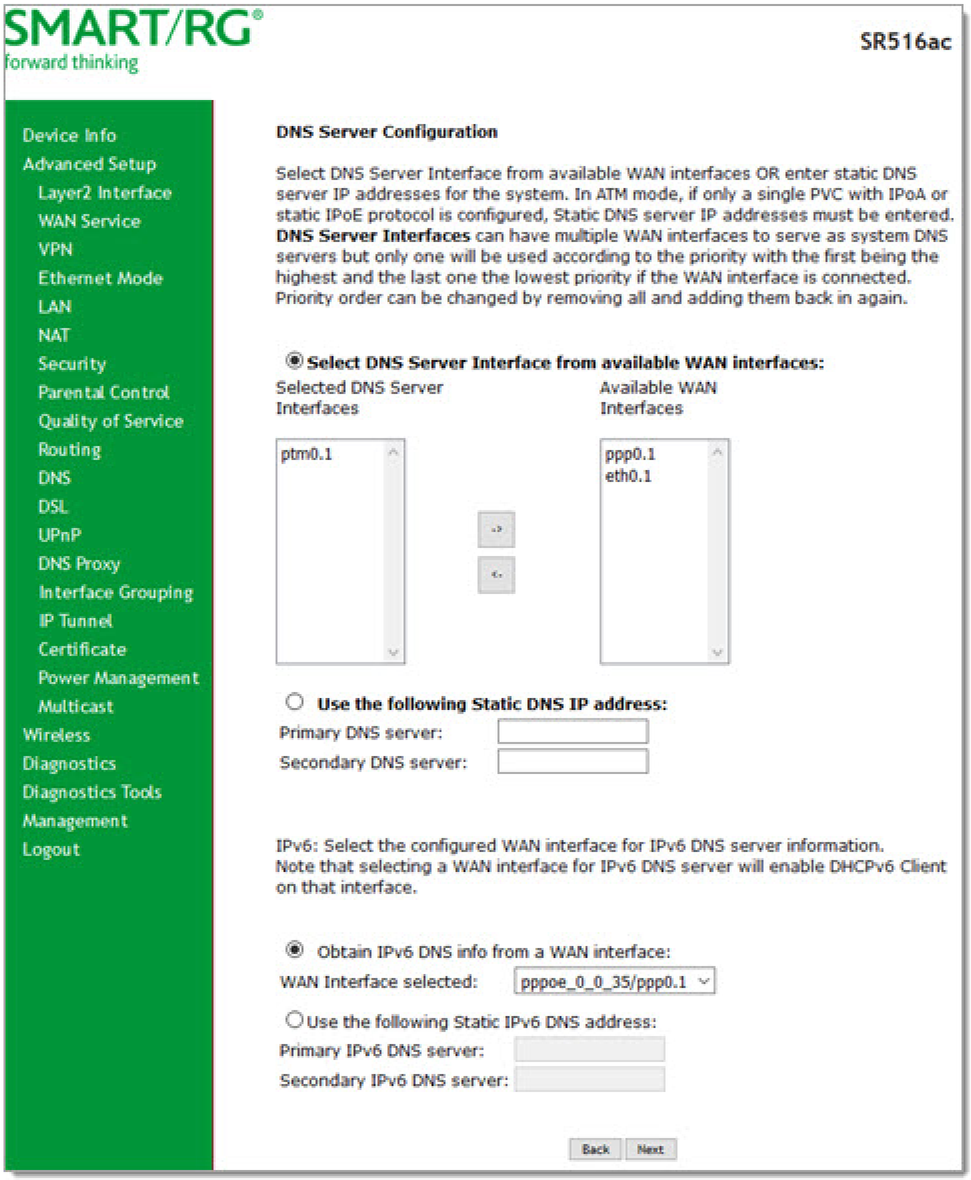
Selected Default Gateway Interfaces	Available Routed WAN Interfaces
ptm0.1	ppp0.1 eth0.1

IPv6: Select a preferred wan interface as the system default IPv6 gateway.

Selected WAN Interface pppoe_0_0_35/ppp0.1

9. Click the **arrows** to move your selections from left to right or from right to left.
10. (*Optional*) For IPv6 environments, in the **Selected WAN Interface** field, select the preferred WAN interface for the default IPv6 gateway.

11. Click **Next**. The following page appears where you will select DNS Server settings.



DNS Server Configuration

Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered. **DNS Server Interfaces** can have multiple WAN interfaces to serve as system DNS servers but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

● **Select DNS Server Interface from available WAN interfaces:**

Selected DNS Server Interfaces	Available WAN Interfaces
ptm0.1	ppp0.1 eth0.1

○ **Use the following Static DNS IP address:**

Primary DNS server:

Secondary DNS server:

IPv6: Select the configured WAN interface for IPv6 DNS server information. Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.

● Obtain IPv6 DNS info from a WAN interface:

WAN Interface selected: pppoe_0_0_35/ppp0.1

○ Use the following Static IPv6 DNS address:

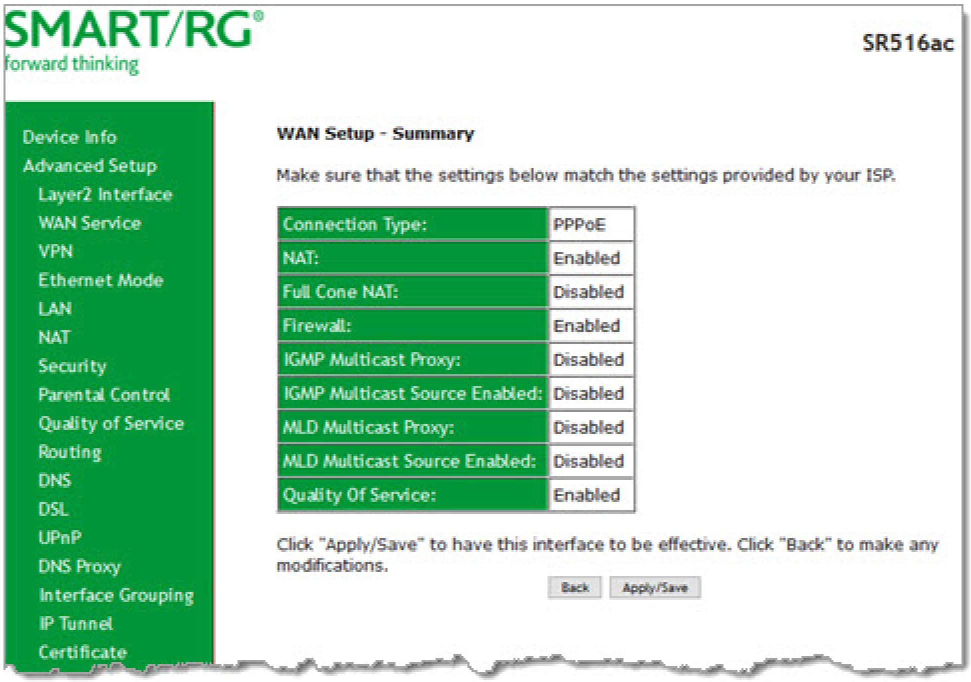
Primary IPv6 DNS server:

Secondary IPv6 DNS server:

12. Do one of the following to configure the DNS:
    - **Select the DNS server interface:** Select interface entries and click the **arrows** to move the entries right or left.
    - **Define a static DNS IP address:** Click **Use the following Static DNS IP address** and enter the DNS server IP addresses.
    - **Obtain IPv6 DNS info from a WAN interface:** In the **Obtain IPv6 DNS info from a WAN interface** field, select a WAN interface.

- **Define a static IPv6 DNS IP address:** Click **Use the following Static IPv6 DNS address** and enter the DNS server IP addresses.

13. Click **Next**. The summary page appears indicating that your PPPoE WAN setup is complete.



WAN Setup - Summary

Make sure that the settings below match the settings provided by your ISP.

Connection Type:	PPPoE
NAT:	Enabled
Full Cone NAT:	Disabled
Firewall:	Enabled
IGMP Multicast Proxy:	Disabled
IGMP Multicast Source Enabled:	Disabled
MLD Multicast Proxy:	Disabled
MLD Multicast Source Enabled:	Disabled
Quality Of Service:	Enabled

Click "Apply/Save" to have this interface to be effective. Click "Back" to make any modifications.

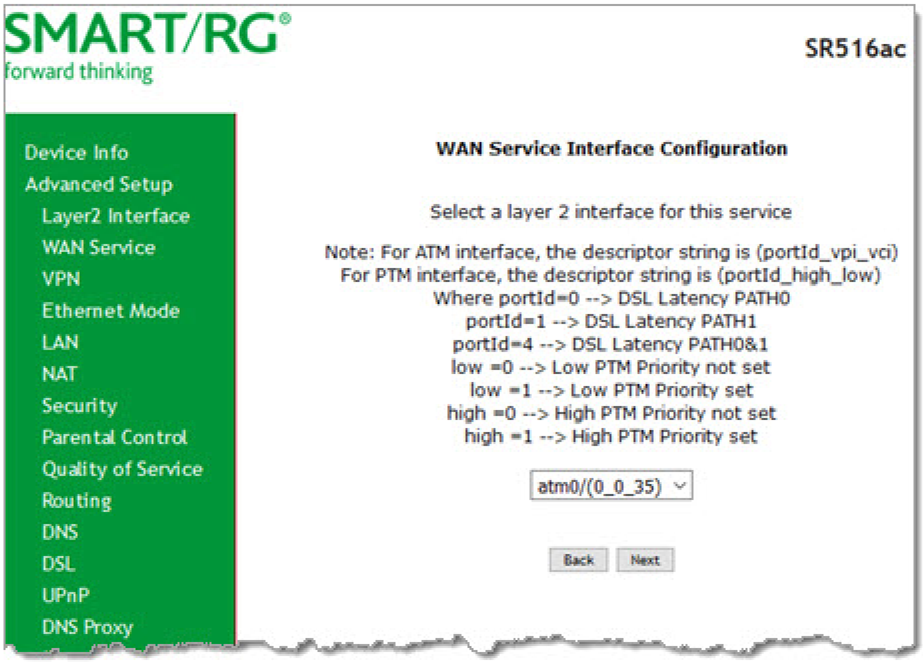
14. Review the summary and either click **Apply/Save** to commit your changes or click **Back** to step through the pages in reverse order to make any necessary alterations.

IP over Ethernet WAN Service

There are several parts to configuring an IP over Ethernet (IPoE) WAN service. You will progress through several pages to complete the configuration.

Before you can configure a WAN service, make sure that the related Layer2 Interface has been configured.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



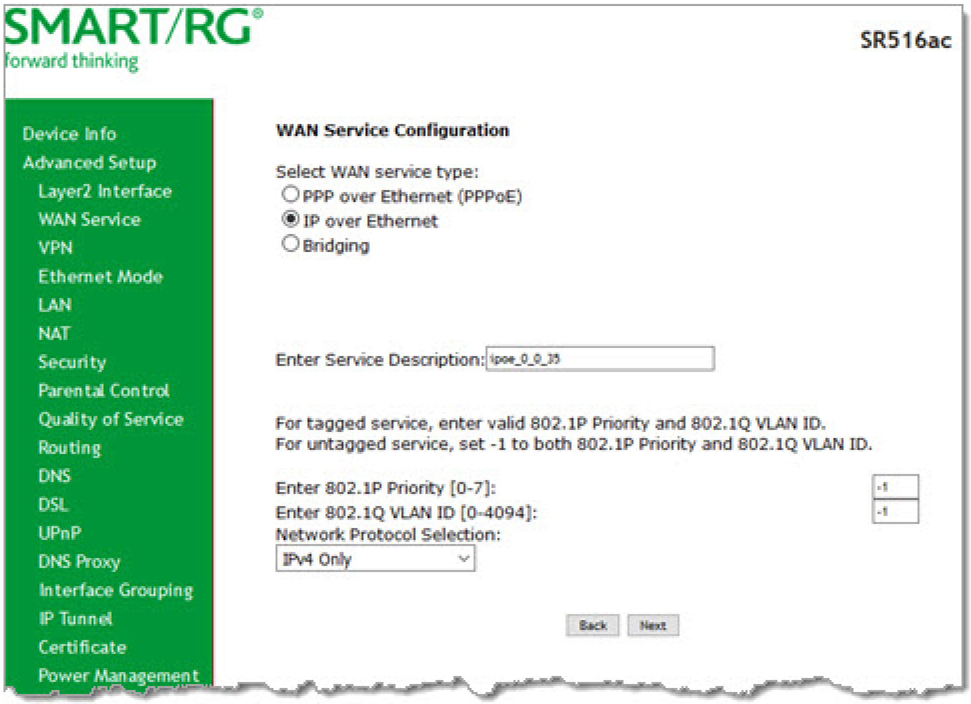
WAN Service Interface Configuration

Select a layer 2 interface for this service

Note: For ATM interface, the descriptor string is (portId_vpi_vci)
For PTM interface, the descriptor string is (portId_high_low)
Where portId=0 --> DSL Latency PATH0
portId=1 --> DSL Latency PATH1
portId=4 --> DSL Latency PATH0&1
low =0 --> Low PTM Priority not set
low =1 --> Low PTM Priority set
high =0 --> High PTM Priority not set
high =1 --> High PTM Priority set

atm0/(0_0_35)

2. Select an ATM interface to use for the WAN service and click **Next**. The following page appears.



WAN Service Configuration

Select WAN service type:
○ PPP over Ethernet (PPPoE)
● IP over Ethernet
○ Bridging

Enter Service Description: ipoe_0_0_35

For tagged service, enter valid 802.1P Priority and 802.1Q VLAN ID.
For untagged service, set -1 to both 802.1P Priority and 802.1Q VLAN ID.

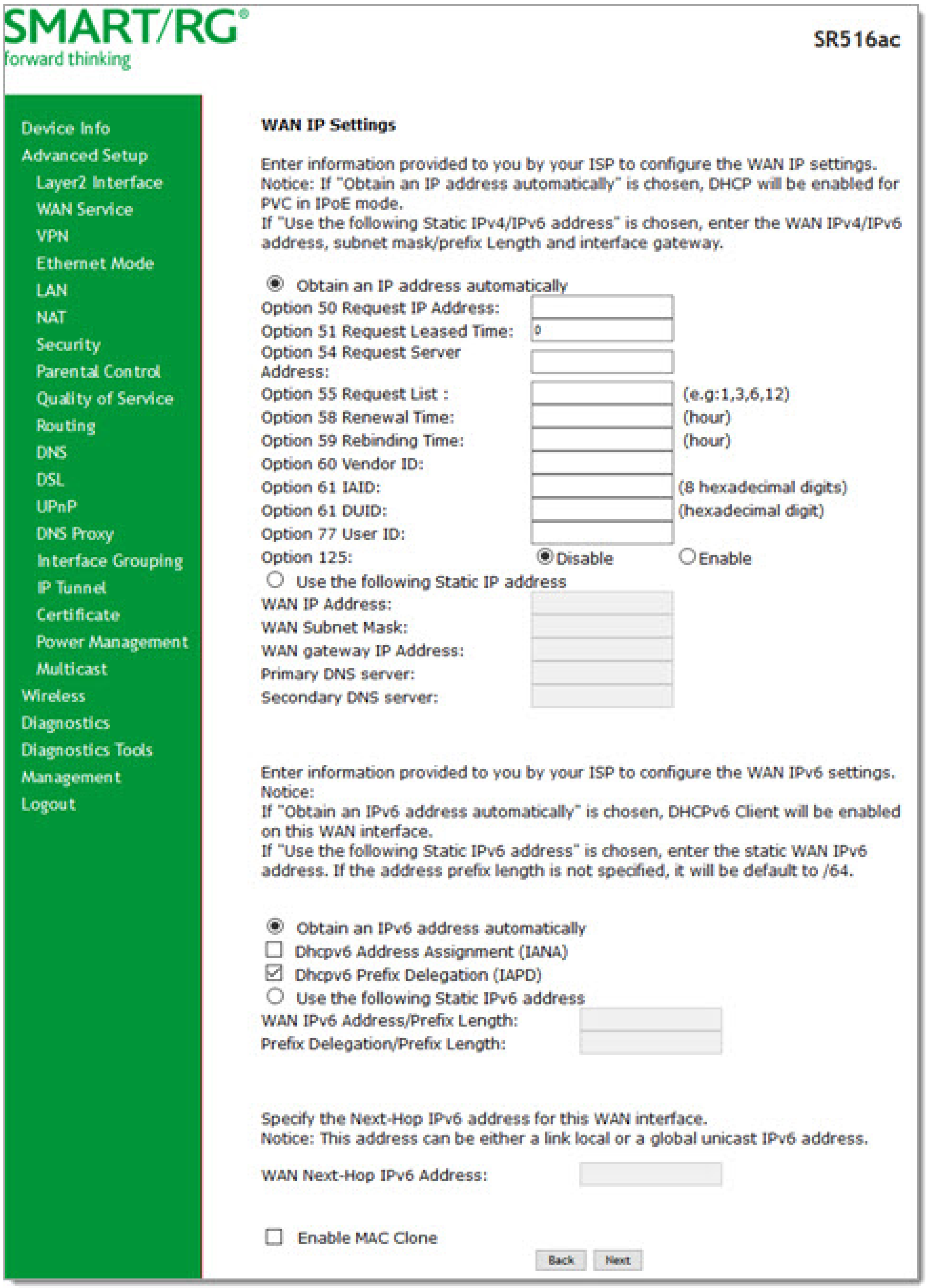
Enter 802.1P Priority [0-7]: -1
Enter 802.1Q VLAN ID [0-4094]: -1
Network Protocol Selection:
IPv4 Only

3. Select **IP over Ethernet**.
4. Modify the other fields as needed, using the information in the following table.

Field Name	Description
Enter Service Description	(*Optional*) Enter a name to describe this configuration.
Enter 802.1P Priority	Options are **0** - **7**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, accept the defaults of **-1** (disabled) in this field and the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, accept the defaults of **-1** (disabled) in this field and the **802.1P Priority** field.
Network Protocol Selection	Different scheduling priorities can be applied to statistically multiplexed data flows. Since each data flow has its own queue, an ill-behaved flow (which has sent larger packets or more packets per second than the others) will only punish itself and not other sessions. Options are **IPv4 Only**,

Field Name	Description
	IPv4&IPv6 (Dual Stack), and **IPv6 Only**. The default is **IPv4 Only**. **Note:** When you select **IPV4&IPV6** or **IPV6**, the options presented on later pages change accordingly.

5. Click **Next**. The following page appears.



WAN IP Settings

Enter information provided to you by your ISP to configure the WAN IP settings.
Notice: If "Obtain an IP address automatically" is chosen, DHCP will be enabled for PVC in IPoE mode.
If "Use the following Static IPv4/IPv6 address" is chosen, enter the WAN IPv4/IPv6 address, subnet mask/prefix Length and interface gateway.

● Obtain an IP address automatically

Option 50 Request IP Address:		
Option 51 Request Leased Time:	0	
Option 54 Request Server Address:		
Option 55 Request List :		(e.g:1,3,6,12)
Option 58 Renewal Time:		(hour)
Option 59 Rebinding Time:		(hour)
Option 60 Vendor ID:		
Option 61 IAID:		(8 hexadecimal digits)
Option 61 DUID:		(hexadecimal digit)
Option 77 User ID:		
Option 125:	● Disable	○ Enable

○ Use the following Static IP address

WAN IP Address:	
WAN Subnet Mask:	
WAN gateway IP Address:	
Primary DNS server:	
Secondary DNS server:	

Enter information provided to you by your ISP to configure the WAN IPv6 settings.
Notice:
If "Obtain an IPv6 address automatically" is chosen, DHCPv6 Client will be enabled on this WAN interface.
If "Use the following Static IPv6 address" is chosen, enter the static WAN IPv6 address. If the address prefix length is not specified, it will be default to /64.

● Obtain an IPv6 address automatically
□ Dhcpv6 Address Assignment (IANA)
☑ Dhcpv6 Prefix Delegation (IAPD)
○ Use the following Static IPv6 address

WAN IPv6 Address/Prefix Length:	
Prefix Delegation/Prefix Length:	

Specify the Next-Hop IPv6 address for this WAN interface.
Notice: This address can be either a link local or a global unicast IPv6 address.

WAN Next-Hop IPv6 Address:

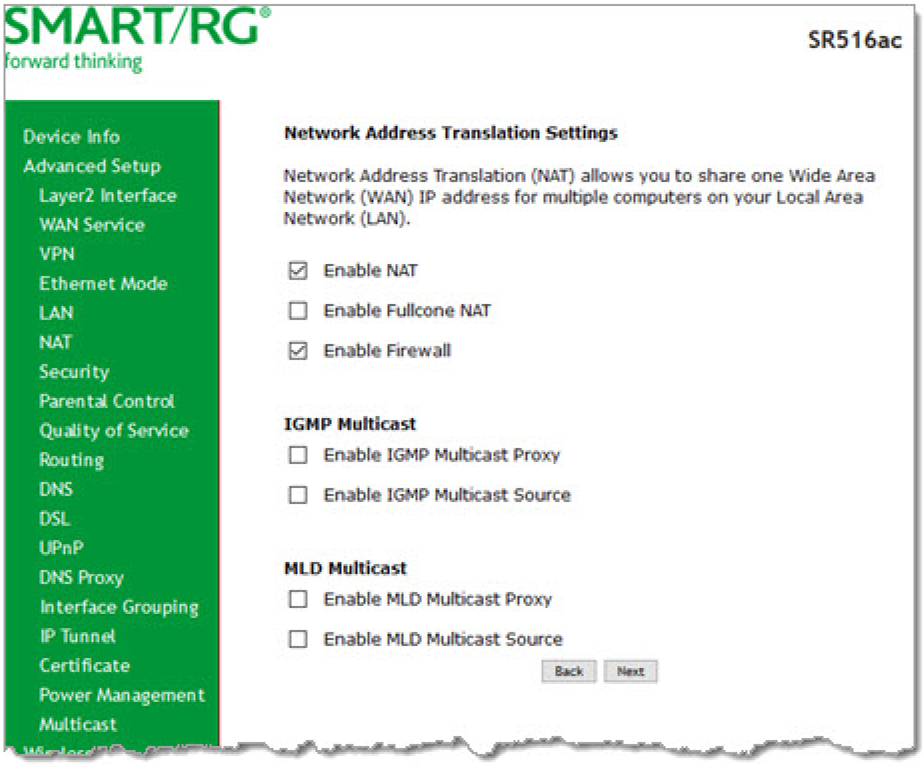
□ Enable MAC Clone

6. Enter the relevant WAN IP Settings, using the information provided in the table below.

Field Name	Description
Obtain an IP address automatically	This option is selected by default. DHCP is enabled in MER mode. Click to prevent the ISP automatically assigning the WAN IP to the gateway.
Option 50 Request IP Address	Enter the IP address to be used when sending messages. If the specified address is not available, the DHCP server assigns the next allowed IP address.
Option 51 Request Leased Time	Enter the maximum lease time defined for the client. The default is **zero** (**0**).
Option 54 Request Server Address	Enter the IP address of the source server.
Option 55 Request List	Enter the configuration parameter numbers, separated by commas.
Option 58 Renewal Time	Enter the number of hours before the DHCP client begins to renew its address lease with the DHCP server.
Option 59 Rebinding Time	Enter the number of hours before the DHCP client enters the rebinding state if it has not renewed its current address lease with the DHCP server.
Option 60 Vendor ID	(*Optional*) Enter the vendor ID to broadcast so the DHCP server can accept the device.
Option 61 IAID	(*Optional*) Enter the Interface Association Identifier (IAID). This is a unique identifier for an IA, chosen by the client.
Option 61 DUID	(*Optional*) Enter the DHCP Unique Identifier (DUID) is used by the client to get an IP address from the DHCP server.
Option 77 User ID	(*Optional*) Enter the user class ID that should be used to filter traffic.
Option 125	(*Optional*) Select whether local devices can automatically receive DHCP options from the server. The default is **Disable**.
Use the following Static IP address	Click to manually declare the static IP information provided by your ISP. When you select this option, you must enter the WAN IP address, subnet mask and gateway IP address.
WAN IP Address	(*Available only when **Static IP address** is selected*) Enter the static WAN IPV4 address.
WAN Subnet Mask	(*Available only when **Static IP address** is selected*) Enter the static subnet mask.
WAN gateway IP Address	(*Available only when **Static IP address** is selected*) Enter the static gateway IP address.
Primary DNS Server	(*Available only when **Static IP address** is selected*) (*Optional*) Enter the IP address of the primary DNS server.
Secondary DNS Server	(*Available only when **Static IP address** is selected*) (*Optional*) Enter the IP address of the secondary DNS server.

Field Name	Description
IPv6 settings section	
The following fields appear when either **IPv6 Only** or **IPv4&IPv6 (Dual Stack)** is selected in the **Network Protocol Selection** field on the WAN Service Configuration page.	
Obtain an IPv6 address automatically	This option is set to enabled by default and allows the ISP to automatically assign the WAN IP address to the gateway. To *disable* the DHCPv6 Client on this WAN interface, click the radio button.
Dhcpv6 Address Assignment (IANA)	Select this option for the CPE to receive the WAN IP from the ISP.
Dhcpv6 Prefix Delegation (IAPD)	This option is selected by default. The CPE generates the WAN IP's prefix from the server's REST by MAC address. To *disable* this option, clear the checkbox.
Use the following Static IPv6 address	Select this option to enter the v6 Static IP information provided by your ISP.
WAN IPv6 Address/Prefix Length	(*Available only when **Static IPv6 address** is selected*) If entering a static IP address, enter the IP address / prefix length. If you do not specify a prefix length, the default of **/64** is used.
Prefix Delegation/Prefix Length	(*Available only when **Static IPv6 address** is selected*) (*Optional*) Enter the prefix delegation ID and prefix length for WAN.
WAN Next-Hop IPv6 address	(*Available only when **Static IPv6 address** is selected*) Enter the IP address of the next WAN in the group. This address can be either a local link or a global unicast IPv6 address.
Enable MAC Clone	(*Available for IPv4-only or IPv4-IPv6 Dual Stack environments*) Select to enable MAC cloning; then enter the MAC address that you want to clone. To use the MAC address of the connected PC, click **Clone the PC MAC Address**. To use a dynamic MAC address, leave this field as-is.

7. Click **Next**. The following page appears.



Network Address Translation Settings

Network Address Translation (NAT) allows you to share one Wide Area Network (WAN) IP address for multiple computers on your Local Area Network (LAN).

☑ Enable NAT

□ Enable Fullcone NAT

☑ Enable Firewall

IGMP Multicast

□ Enable IGMP Multicast Proxy

□ Enable IGMP Multicast Source

MLD Multicast

□ Enable MLD Multicast Proxy

□ Enable MLD Multicast Source

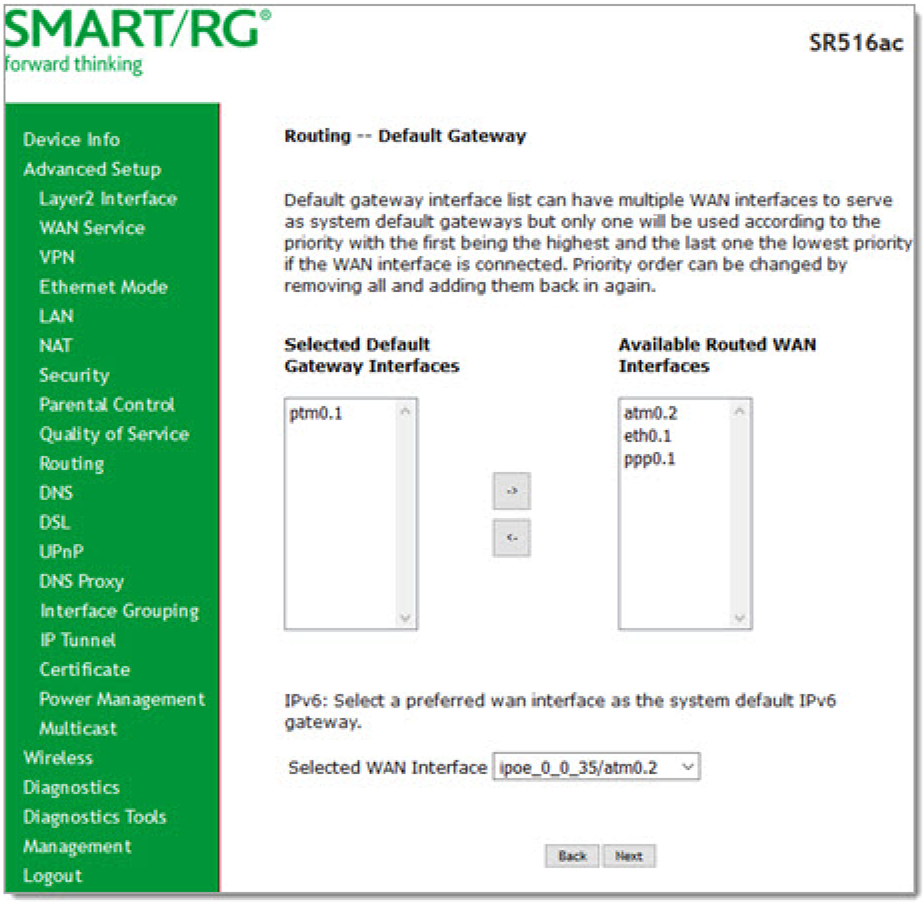
8. Modify the settings as needed for your environment.
Network Address Translation (NAT) allows you to share one Wide Area Network (WAN) IP address for multiple computers on your Local Area Network (LAN). If you do not want to enable NAT (atypical) and wish the user of this gateway to access the Internet normally, you need to add a route on the uplink equipment. Failure to do so will cause access to the Internet to fail.

The fields on this page are defined below.

FIELD NAME	DESCRIPTION
Enable NAT	This option is selected by default. Click to *disable* sharing the WAN interface across multiple devices on the LAN. This setting also enables the functions in the NAT sub-menu and addition PPPoE NAT features to select.
Enable Fullcone NAT	Click to enable one-to-one NAT. All requests from the same internal IP address and port are mapped to the same external IP address and port. In addition, any external host can send a packet to the internal host by sending a packet to the mapped external address. **Warning**: Enabling this option will *disable* network acceleration and some security settings.
Enable Firewall	This option is selected by default. Click to *disable* functions in the **Security** sub-menu.

FIELD NAME	DESCRIPTION
Enable IGMP Multicast Proxy	Select to enable Internet Group Membership Protocol (IGMP) multicast. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable IGMP Multicast Source	Select to enable this service to act as an IGMP multicast source.
Enable MLD Multicast Proxy	*(Available only for IPv6 environments)* Click to enable multicast filtering. Used by IPv4 hosts to report multicast group memberships to any neighboring multicast routers.
Enable MLD Multicast Source	*(Available only for IPv6 environments)* Select to enable this service to act as a multicast source.

9. Click **Next**. The following page appears.



Routing -- Default Gateway

Default gateway interface list can have multiple WAN interfaces to serve as system default gateways but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

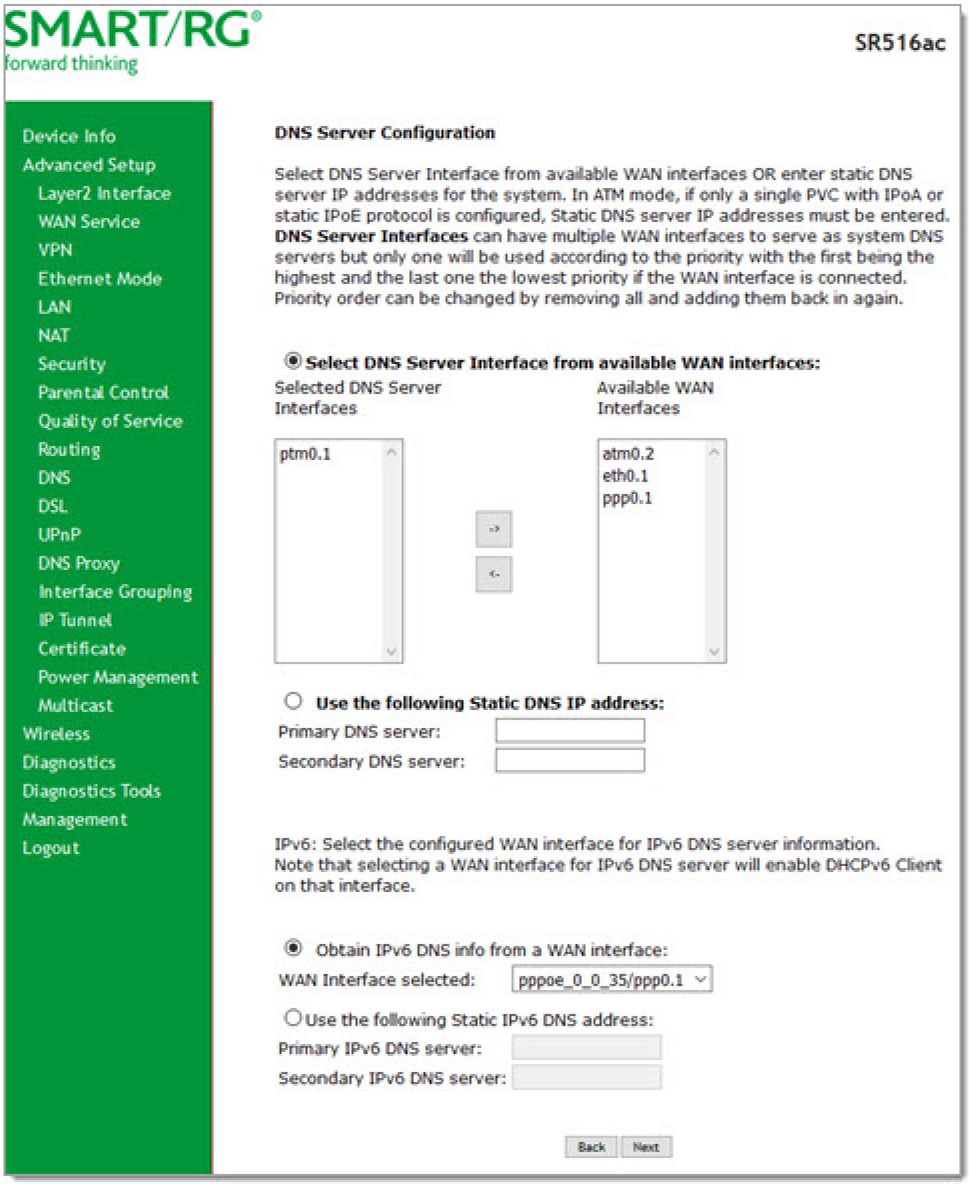
Selected Default Gateway Interfaces	Available Routed WAN Interfaces
ptm0.1	atm0.2 eth0.1 ppp0.1

IPv6: Select a preferred wan interface as the system default IPv6 gateway.

Selected WAN Interface: ipoe_0_0_35/atm0.2

10. Select a WAN interface to act as the system default gateway or accept the default interface.
11. (*Optional*) For IPv6 environments, in the **Selected WAN Interface** field, select the preferred WAN interface for the default IPv6 gateway.

12. Click **Next**. The following page appears.



DNS Server Configuration

Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered. **DNS Server Interfaces** can have multiple WAN interfaces to serve as system DNS servers but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

● **Select DNS Server Interface from available WAN interfaces:**

Selected DNS Server Interfaces	Available WAN Interfaces
ptm0.1	atm0.2 eth0.1 ppp0.1

○ **Use the following Static DNS IP address:**

Primary DNS server:

Secondary DNS server:

IPv6: Select the configured WAN interface for IPv6 DNS server information. Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.

● Obtain IPv6 DNS info from a WAN interface:

WAN Interface selected: pppoe_0_0_35/ppp0.1

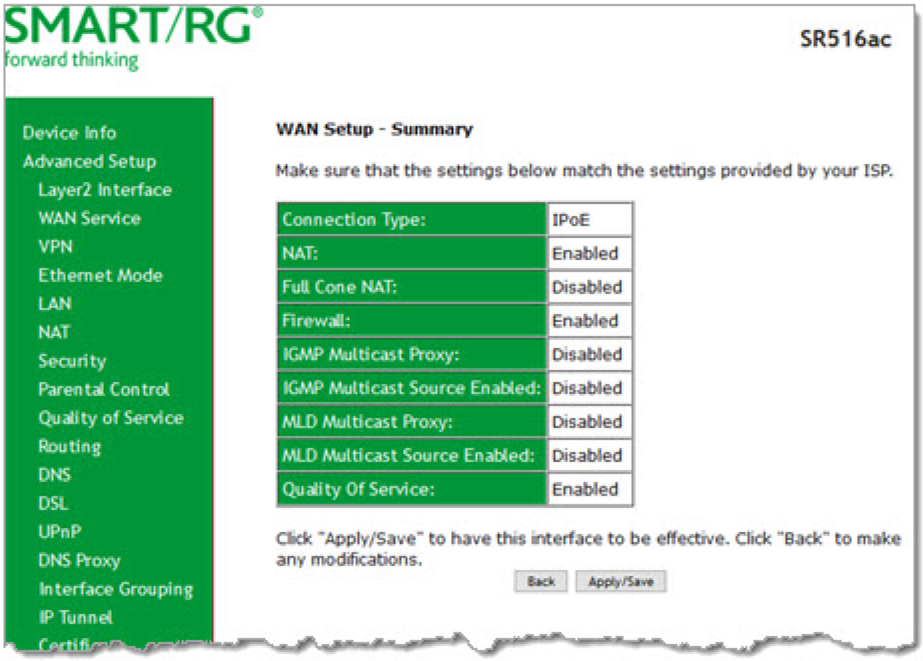
○ Use the following Static IPv6 DNS address:

Primary IPv6 DNS server:

Secondary IPv6 DNS server:

13. Modify the settings as needed.

14. Click **Next**. The following page appears.



WAN Setup - Summary

Make sure that the settings below match the settings provided by your ISP.

Connection Type:	IPoE
NAT:	Enabled
Full Cone NAT:	Disabled
Firewall:	Enabled
IGMP Multicast Proxy:	Disabled
IGMP Multicast Source Enabled:	Disabled
MLD Multicast Proxy:	Disabled
MLD Multicast Source Enabled:	Disabled
Quality Of Service:	Enabled

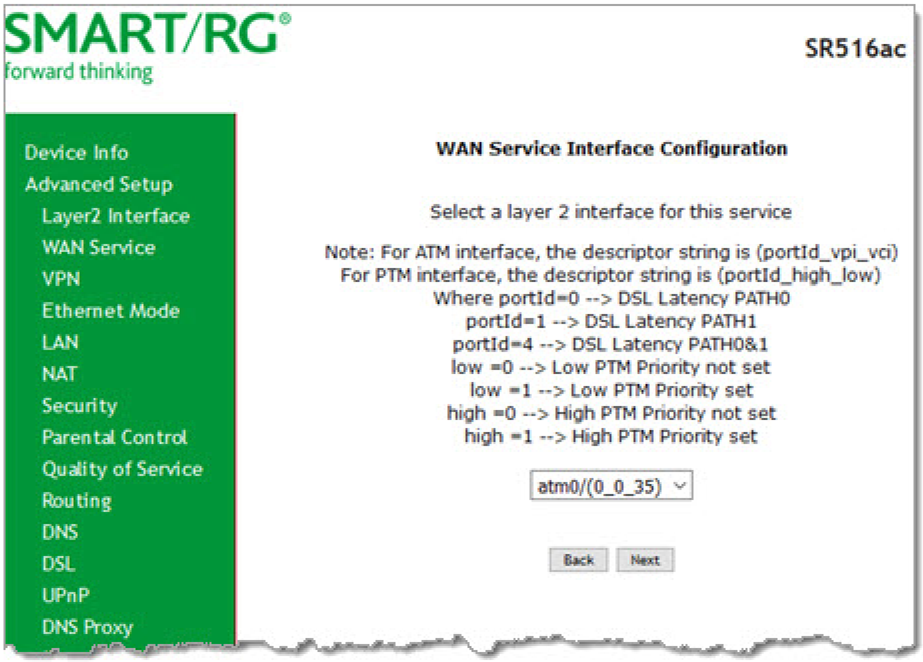
Click "Apply/Save" to have this interface to be effective. Click "Back" to make any modifications.

15. Review the IPoE settings. You can modify the settings by clicking the **Back** button.
16. Click **Apply/Save** to save and apply the settings.

Bridging

Before you can configure a bridge WAN service, you must create the related Layer2 ATM interface.

1. In the left navigation bar, click **Advanced Setup** > **WAN Service** and then click **Add**. The following page appears.



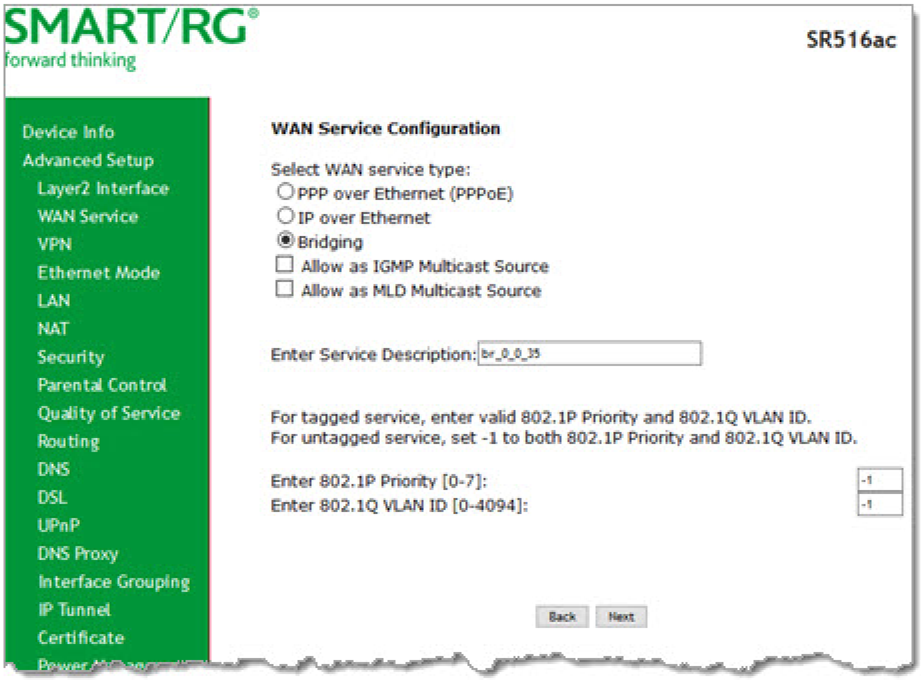
WAN Service Interface Configuration

Select a layer 2 interface for this service

Note: For ATM interface, the descriptor string is (portId_vpi_vci)
For PTM interface, the descriptor string is (portId_high_low)
Where portId=0 --> DSL Latency PATH0
portId=1 --> DSL Latency PATH1
portId=4 --> DSL Latency PATH0&1
low =0 --> Low PTM Priority not set
low =1 --> Low PTM Priority set
high =0 --> High PTM Priority not set
high =1 --> High PTM Priority set

atm0/(0_0_35)

2. Select the interface for the WAN service and then click **Next**. The following page appears.



WAN Service Configuration

Select WAN service type:
○ PPP over Ethernet (PPPoE)
○ IP over Ethernet
● Bridging
□ Allow as IGMP Multicast Source
□ Allow as MLD Multicast Source

Enter Service Description: br_0_0_35

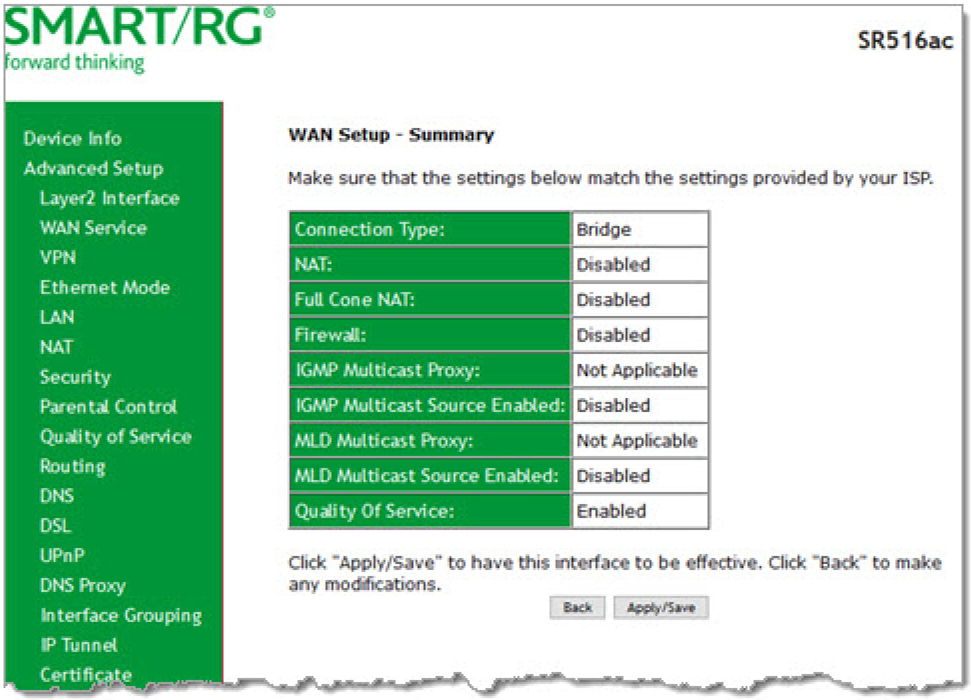
For tagged service, enter valid 802.1P Priority and 802.1Q VLAN ID.
For untagged service, set -1 to both 802.1P Priority and 802.1Q VLAN ID.

Enter 802.1P Priority [0-7]: -1
Enter 802.1Q VLAN ID [0-4094]: -1

3. Select **Bridging**. Multicast source fields appear.
4. Modify the other fields as needed, using the information in the following table.

Field Name	Description
Allow as IGMP Multicast Source	Select to enable this service to act as an IGMP multicast source.
Allow as MLD Multicast Source	Select to enable this service to act as an MLD multicast source.
Enter Service Description	(*Optional*) Enter a different name to describe this configuration.
Enter 802.1P Priority	Options are **0** - **7**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1Q VLAN ID** field. For untagged service, accept the default of **-1** (disabled) in this field and in the **802.1Q VLAN ID** field.
Enter 802.1Q VLAN ID	Options are **0** - **4094**. The default is **-1** (disabled). For tagged service, enter values in this field and the **802.1P Priority** field. For untagged service, accept the default of **-1** (disabled) in this field and in the **802.1P Priority** field.

5. Click **Next**. The summary page appears indicating that your Bridging WAN setup is complete.



WAN Setup - Summary

Make sure that the settings below match the settings provided by your ISP.

Connection Type:	Bridge
NAT:	Disabled
Full Cone NAT:	Disabled
Firewall:	Disabled
IGMP Multicast Proxy:	Not Applicable
IGMP Multicast Source Enabled:	Disabled
MLD Multicast Proxy:	Not Applicable
MLD Multicast Source Enabled:	Disabled
Quality Of Service:	Enabled

Click "Apply/Save" to have this interface to be effective. Click "Back" to make any modifications.

6. Review the summary and either click **Apply/Save** to commit your changes or click **Back** to step through the pages in reverse order to make any necessary alterations.

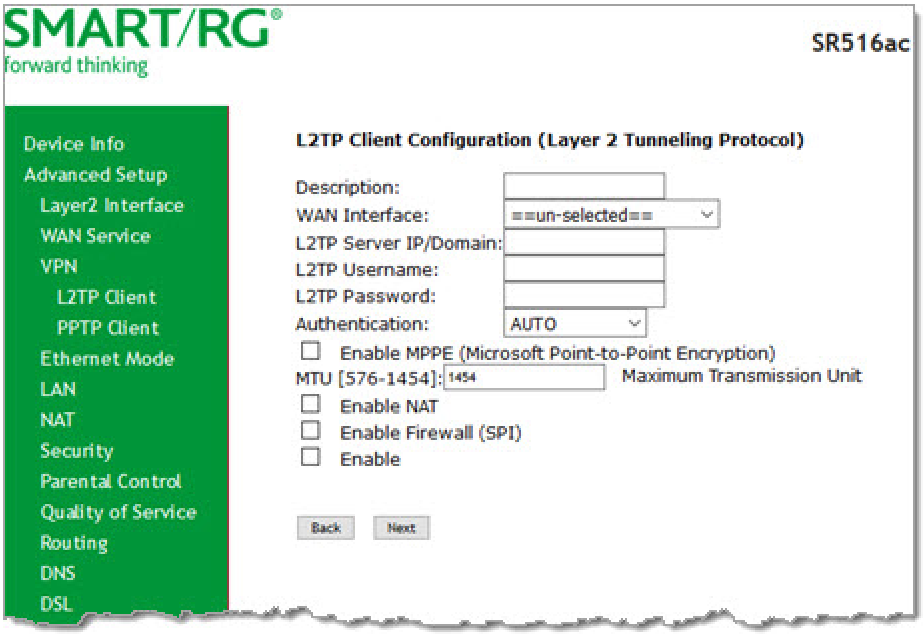
VPN

In this section, you can configure tunneling protocols (L2TP or PPTP clients) for your network. The settings are usually specific to a customer's ISP.

L2TP Client Configuration

On this page, you can configure the L2TP (Layer 2 Tunneling Protocol) client.

1. In the left navigation menu, click **Advanced Setup** > **VPN** and then click **Add**. The following page appears.



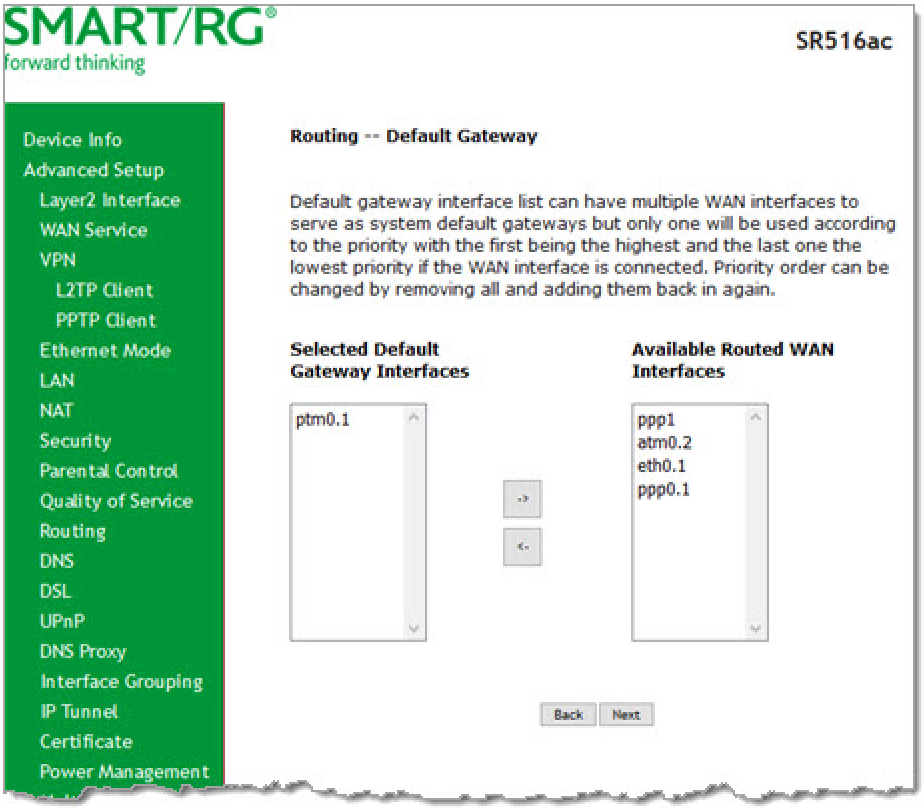
L2TP Client Configuration (Layer 2 Tunneling Protocol)

Description:
WAN Interface: ==un-selected==
L2TP Server IP/Domain:
L2TP Username:
L2TP Password:
Authentication: AUTO
☐ Enable MPPE (Microsoft Point-to-Point Encryption)
MTU [576-1454]: 1454 Maximum Transmission Unit
☐ Enable NAT
☐ Enable Firewall (SPI)
☐ Enable

2. Fill in the fields, using the information in the table below.

Field Name	Description
Description	Enter a useful description of this configuration.
WAN Interface	Select the WAN interface for this client.
L2TP Server IP/Domain	Enter the IP address of the L2TP server.
L2TP Username	Enter the user name for the server.
L2TP Password	Enter the password for the server.
Authentication	Select the authentication method. Options are **NOAUTH**, **AUTO**, **PAP**, **CHAP**, **MS-CHAP_V1**, and **MS-CHAP_V2**. The default is **AUTO**.
Enable MPPE	(*Optional*) Click to enable Microsoft Point-to-Point Encryption.
MTU	(*Optional*) Enter the maximum number of transmission units allowed for this client. Options are **576** - **1454**. The default is **1454**.
Enable NAT	(*Optional*) Click to enable Network Address Translation features.
Enable Firewall (SPI)	(*Optional*) Click to enable the firewall.
Enable	Click to enable this L2TP client configuration.

3. Click **Next**. The following page appears.



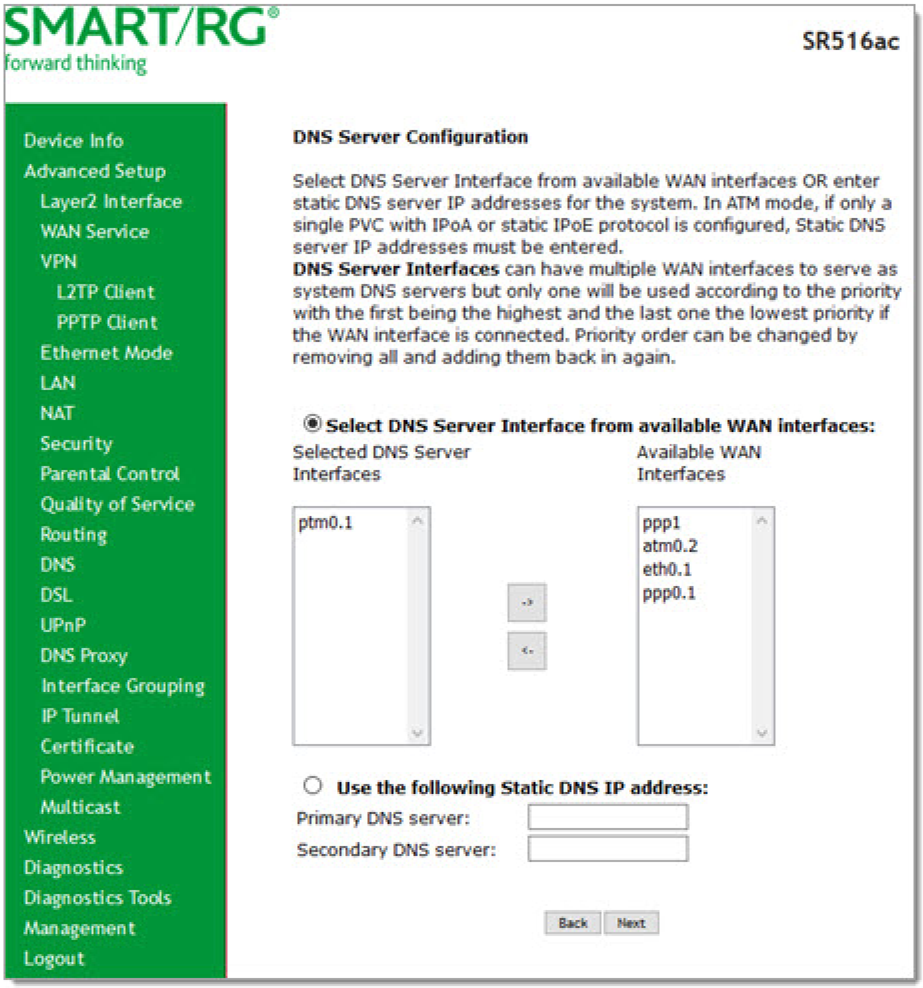
Routing -- Default Gateway

Default gateway interface list can have multiple WAN interfaces to serve as system default gateways but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

Selected Default Gateway Interfaces	Available Routed WAN Interfaces
ptm0.1	ppp1 atm0.2 eth0.1 ppp0.1

4. Select the default gateway by selecting interface entries and clicking the **arrows** to move the entries right or left.

5. Click **Next**. The following page appears.



DNS Server Configuration

Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered.
DNS Server Interfaces can have multiple WAN interfaces to serve as system DNS servers but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

● **Select DNS Server Interface from available WAN interfaces:**

Selected DNS Server Interfaces	Available WAN Interfaces
ptm0.1	ppp1 atm0.2 eth0.1 ppp0.1

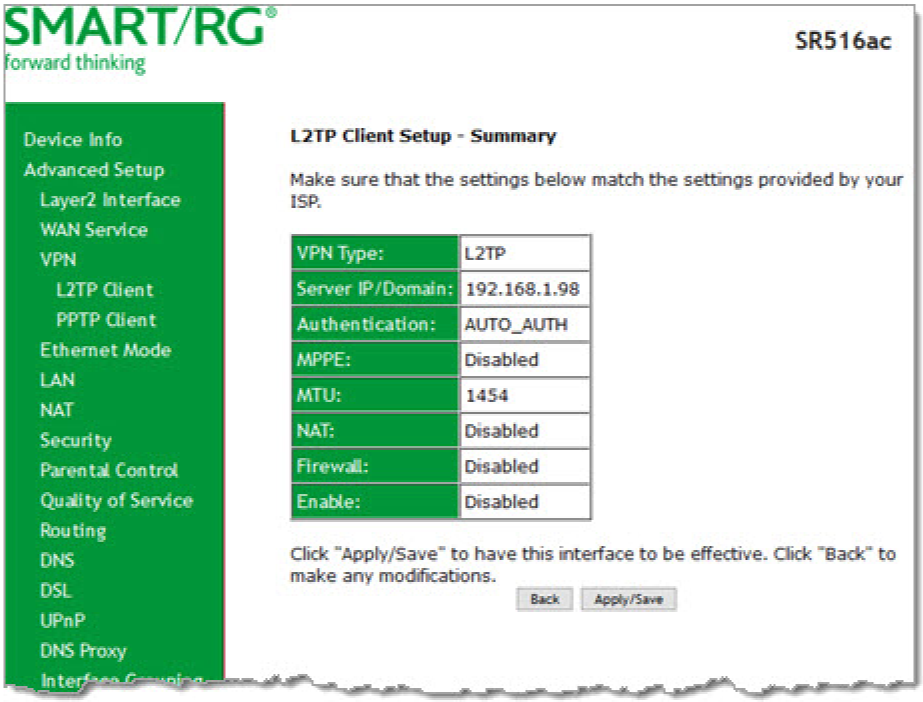
○ **Use the following Static DNS IP address:**

Primary DNS server:

Secondary DNS server:

6. Do one of the following to configure the DNS server:
   - Select the DNS server interface: Select interface entries and clicking the **arrows** to move the entries right or left.
   - Define a static DNS IP address: Click **Use the following Static DNS IP address** and enter the DNS server IP addresses.

7. Click **Next**. The summary page appears.



L2TP Client Setup - Summary

Make sure that the settings below match the settings provided by your ISP.

VPN Type:	L2TP
Server IP/Domain:	192.168.1.98
Authentication:	AUTO_AUTH
MPPE:	Disabled
MTU:	1454
NAT:	Disabled
Firewall:	Disabled
Enable:	Disabled

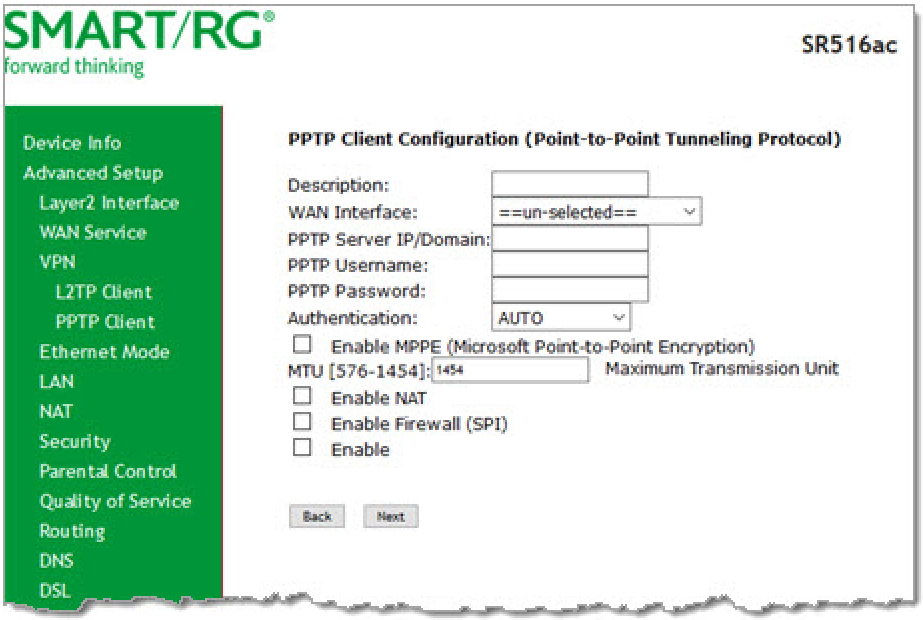
Click "Apply/Save" to have this interface to be effective. Click "Back" to make any modifications.

8. Click **Apply / Save** to implement your settings.

PPTP Client

On this page, you can configure the PPTP (Point-to-Point Tunneling Protocol) client.

1. In the left navigation menu, click Advanced Setup > VPN > PPTP Client and then click Add. The following page appears.



PPTP Client Configuration (Point-to-Point Tunneling Protocol)

Description:	
WAN Interface:	==un-selected==
PPTP Server IP/Domain:	
PPTP Username:	
PPTP Password:	
Authentication:	AUTO

☐ Enable MPPE (Microsoft Point-to-Point Encryption)

MTU [576-1454]: 1454 Maximum Transmission Unit

☐ Enable NAT

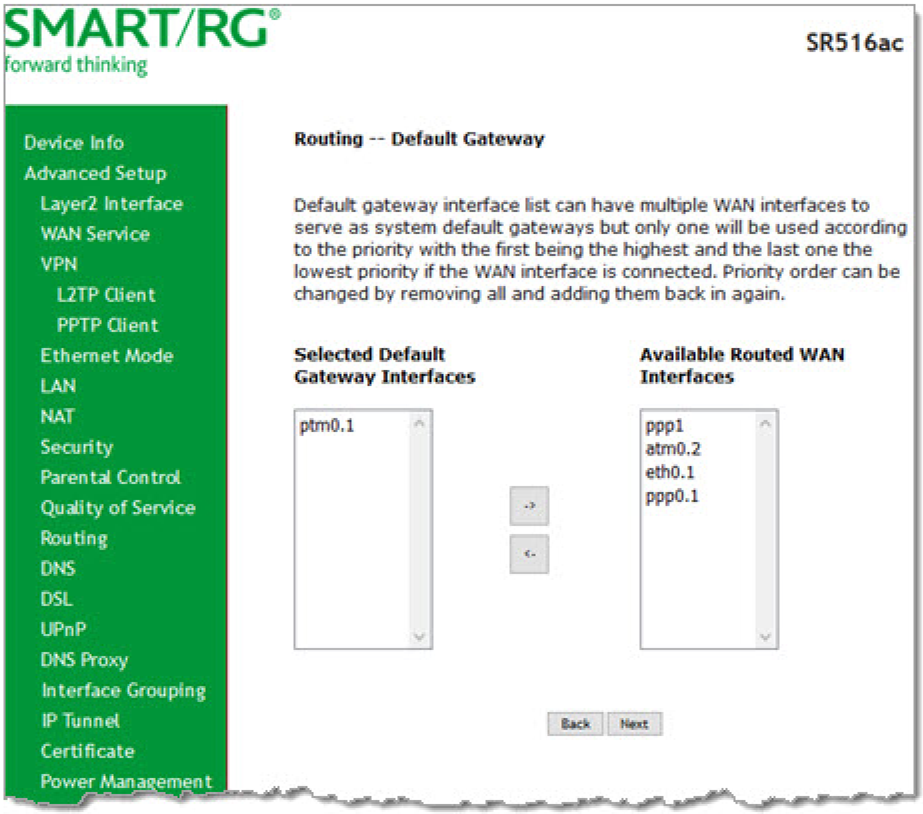
☐ Enable Firewall (SPI)

☐ Enable

2. Fill in the fields, using the information in the table below. The Description, WAN Interface, and PPTP Server IP/Domain fields are required.

Field Name	Description
Description	Enter a useful description of this configuration.
WAN Interface	Select the WAN interface for this client.
PPTP Server IP/Domain	Enter the IP address of the PPTP server.
PPTP Username	If not using the default of "admin", enter the user name for the server.
PPTP Password	If not using the default of "admin", enter the password for the server.
Authentication	Select the authentication method. Options are **NOAUTH**, **AUTO**, **PAP**, **CHAP**, **MS-CHAP_V1**, and **MS-CHAP_V2**.
Enable MPPE	(*Optional*) Select to enable Microsoft Point-to-Point Encryption.
MTU	(*Optional*) Enter the maximum number of transmission units allowed for this client. Options are **576**-**1454**. The default is **1454**.
Enable NAT	(*Optional*) Select to enable Network Address Translation features.
Enable Firewall (SPI)	(*Optional*) Select to enable the firewall.
Enable	Click to enable this PPTP client configuration.

3. Click **Next**. The following page appears.



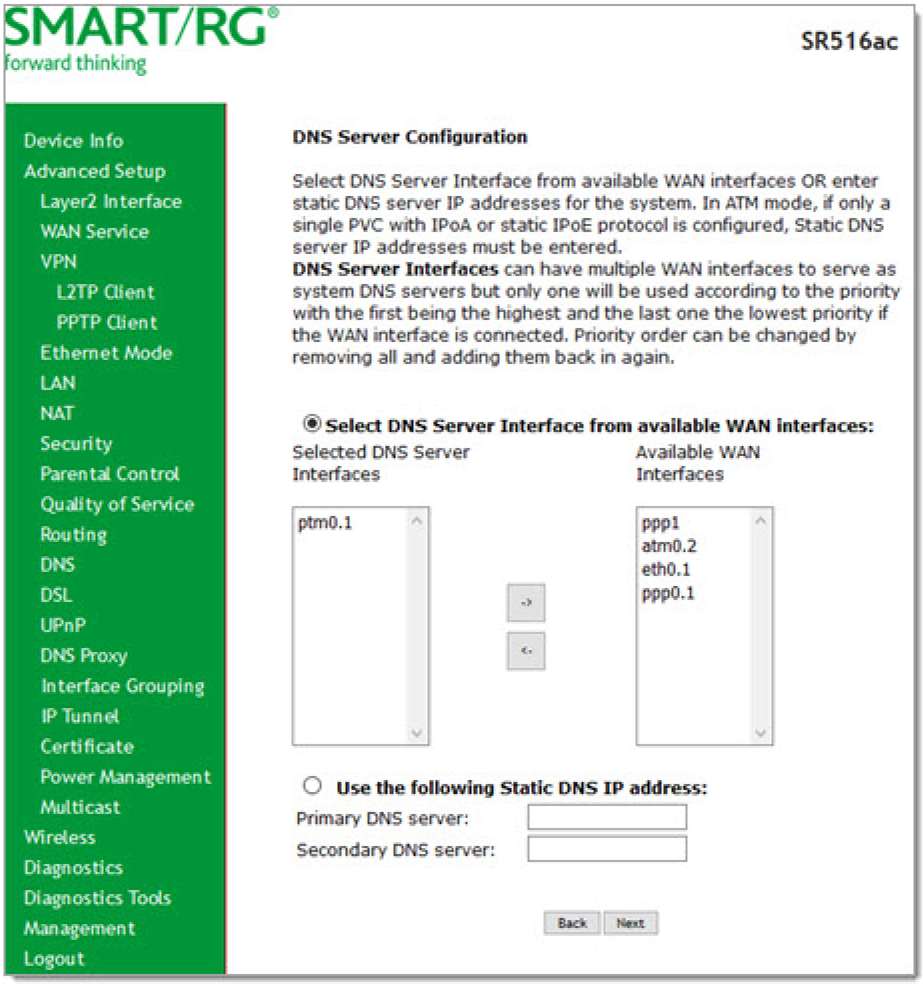
Routing -- Default Gateway

Default gateway interface list can have multiple WAN interfaces to serve as system default gateways but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

Selected Default Gateway Interfaces	Available Routed WAN Interfaces
ptm0.1	ppp1 atm0.2 eth0.1 ppp0.1

4. Select the default gateway by selecting interface entries and clicking the **arrows** to move the entries right or left.

5. Click **Next**. The following page appears.



DNS Server Configuration

Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered.
DNS Server Interfaces can have multiple WAN interfaces to serve as system DNS servers but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

● **Select DNS Server Interface from available WAN interfaces:**

Selected DNS Server Interfaces	Available WAN Interfaces
ptm0.1	ppp1 atm0.2 eth0.1 ppp0.1

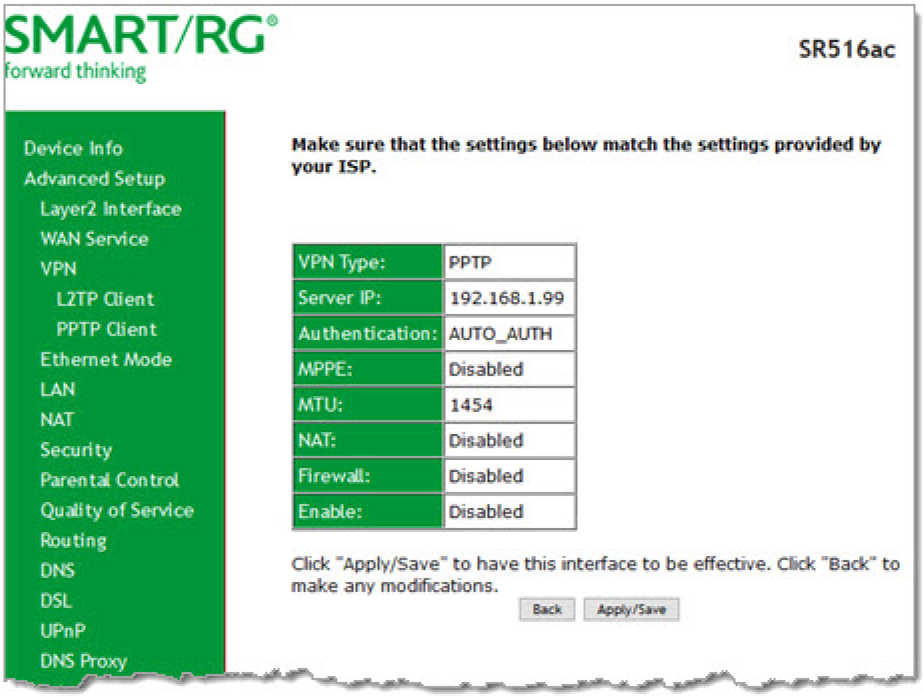
○ **Use the following Static DNS IP address:**

Primary DNS server:

Secondary DNS server:

6. Do one of the following to configure the DNS server:
   - Select the DNS server interface: Select interface entries and clicking the **arrows** to move the entries right or left.
   - Define a static IP address: Click **Use the following Static DNS IP address** and enter the DNS server IP addresses.

7. Click **Next**. The summary page appears.



Make sure that the settings below match the settings provided by your ISP.

VPN Type:	PPTP
Server IP:	192.168.1.99
Authentication:	AUTO_AUTH
MPPE:	Disabled
MTU:	1454
NAT:	Disabled
Firewall:	Disabled
Enable:	Disabled

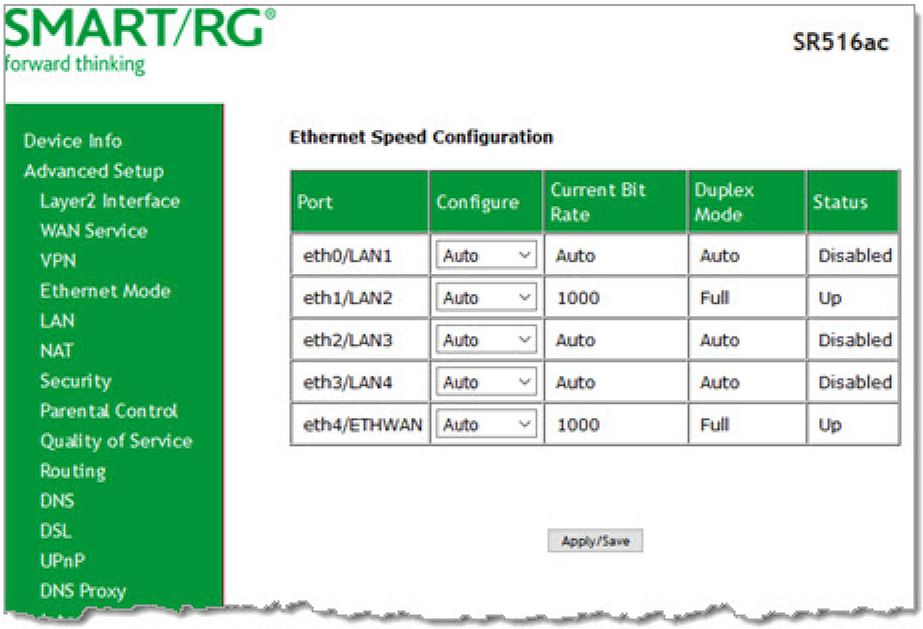
Click "Apply/Save" to have this interface to be effective. Click "Back" to make any modifications.

8. Click **Apply / Save** to implement your settings.

Ethernet Mode

On this page, you can configure the Ethernet speed for your gateway.

1. In the left navigation menu, click Advanced Setup > Ethernet Mode. The following page appears.



Ethernet Speed Configuration

Port	Configure	Current Bit Rate	Duplex Mode	Status
eth0/LAN1	Auto	Auto	Auto	Disabled
eth1/LAN2	Auto	1000	Full	Up
eth2/LAN3	Auto	Auto	Auto	Disabled
eth3/LAN4	Auto	Auto	Auto	Disabled
eth4/ETHWAN	Auto	1000	Full	Up

2. To set a specific speed, select it in the Configure field.
   Options are **Auto**, **100 Full**, **100 Half**, **10 Full**, and **10 Half**. The default is **Auto**.
3. Click Apply/Save to apply your changes.

LAN

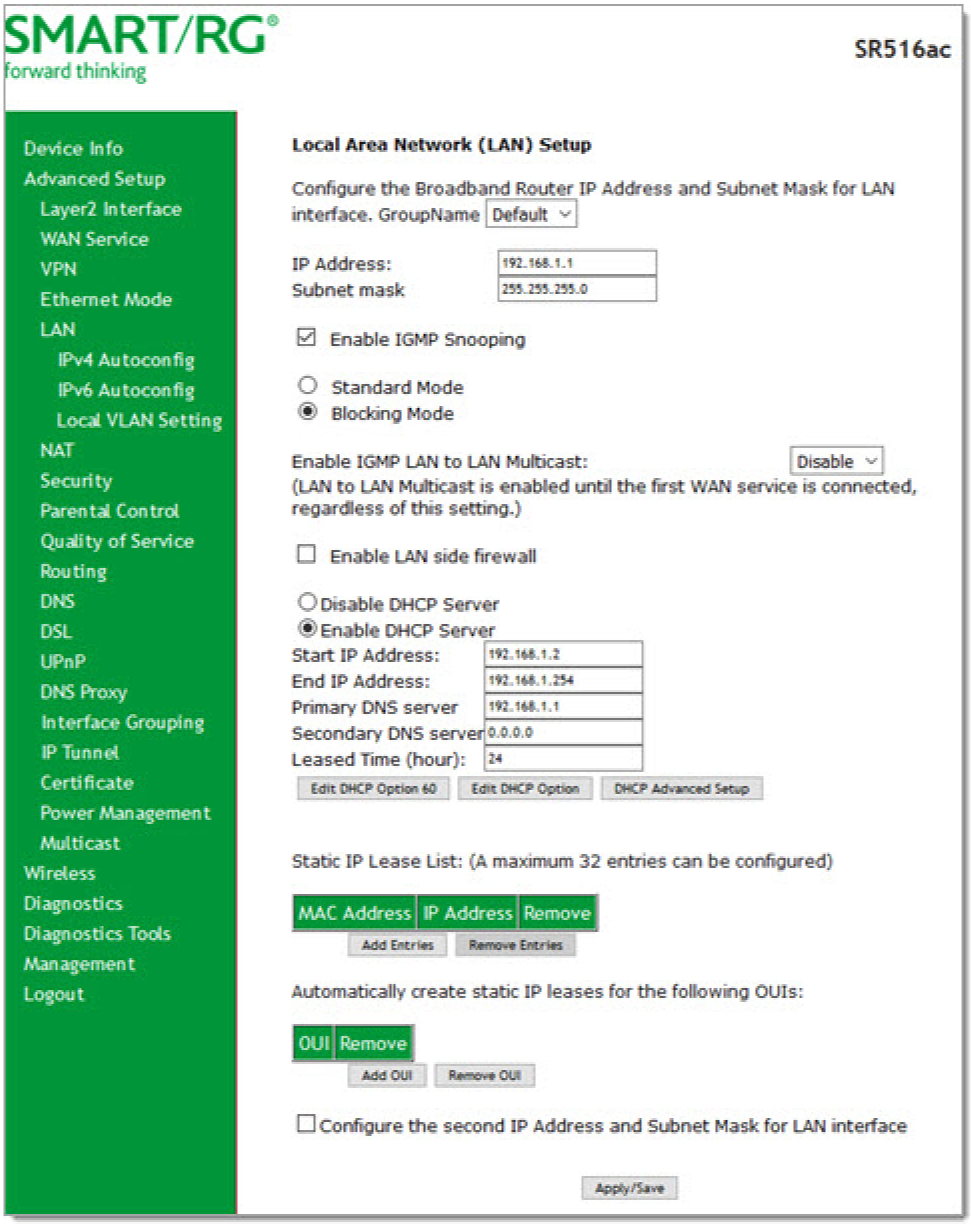
In this section, you can configure an IP address for the DSL gateway, enable IGMP snooping, enable or disable the DHCP server, edit the DHCP options, configure the DHCP advanced setup, and set the binding between a MAC address and an IP address.

IGMP snooping enables the gateway to forward multicast traffic intelligently, instead of flooding all ports in the VLAN. With IGMP snooping, the gateway listens to IGMP membership reports, queries and leave messages to identify the switch ports that are members of multicast groups. Multicast traffic will only be forwarded to ports identified as members of the specific multicast group or groups.

If you enable the DHCP server, the clients will automatically acquire the IP address from the DHCP server. If the DHCP server is disabled, you need to manually set the start IP address, end IP address and the lease time for the clients in the LAN.

IPv4 Autoconfig

1. In the left navigation menu, click Advanced Setup > LAN. The following page appears. You can also reach this page by clicking Advanced Setup > LAN > IPv4 Autoconfig in the left menu.



Local Area Network (LAN) Setup

Configure the Broadband Router IP Address and Subnet Mask for LAN interface. GroupName Default

IP Address: 192.168.1.1
Subnet mask 255.255.255.0

☑ Enable IGMP Snooping

○ Standard Mode
● Blocking Mode

Enable IGMP LAN to LAN Multicast: Disable
(LAN to LAN Multicast is enabled until the first WAN service is connected, regardless of this setting.)

☐ Enable LAN side firewall

○ Disable DHCP Server
● Enable DHCP Server
Start IP Address: 192.168.1.2
End IP Address: 192.168.1.254
Primary DNS server 192.168.1.1
Secondary DNS server 0.0.0.0
Leased Time (hour): 24

Static IP Lease List: (A maximum 32 entries can be configured)

MAC Address	IP Address	Remove

Automatically create static IP leases for the following OUIs:

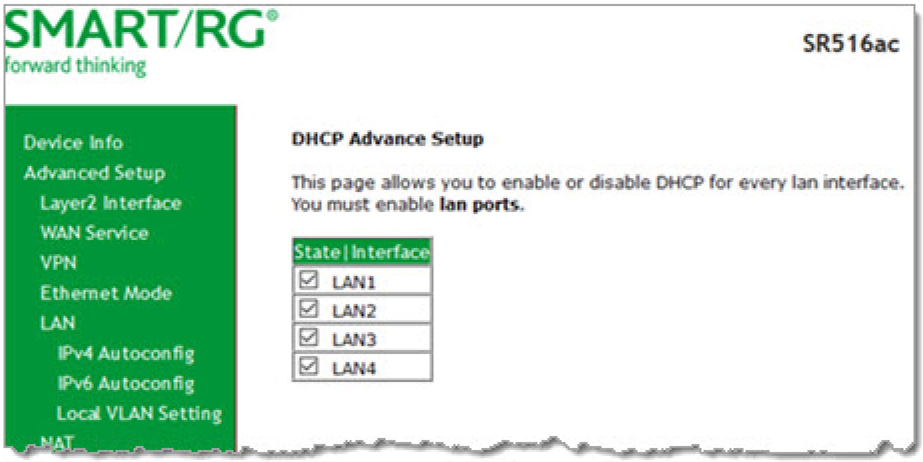
OUI	Remove

☐ Configure the second IP Address and Subnet Mask for LAN interface

2. (*Optional*) In the GroupName field, select the interface group for this configuration. If there are no groupings defined, the only option is **Default**.
3. Modify the other fields using the information in the following table. The default configuration settings work for most scenarios.

Field	Description
IP Address / Subnet Mask	(*Optional*) Modify the IP address and subnet mask of the device. The default IP address is that of the gateway and the subnet mask is 255.255.255.0.
Enable IGMP Snooping	This option is enabled by default. Options are **Standard Mode** and **Blocking Mode**. The default is **Blocking Mode**. To *disable* this option, clear the check box.
Enable IGMP LAN to LAN Multicast	This option is disabled by default. To *enable* this option, select **Enable**.
Enable LAN side firewall	Click to enable the LAN-side firewall.
Disable DHCP Server / Enable DHCP Server	This option is enabled by default. You can modify the address, server and leased time fields as needed. To *disable* the DHCP server, click **Disable DHCP Server**. Then, if needed, enter different server information for the LAN.
Edit DHCP Option 60	To modify the vendor class information, click **Edit DHCP Option 60**, modify the entries, and click the appropriate action button. Then click **Return**.
Edit DHCP Option	To add information about other DHCP options, click **Edit DHCP Option**, enter the information for the desired options, and click the appropriate action button. Then click **Return**.

4. To enable or disable DHCP for individual LAN interfaces:
   a. Click **DHCP Advanced setup**. The DHCP Advance Setup page appears.



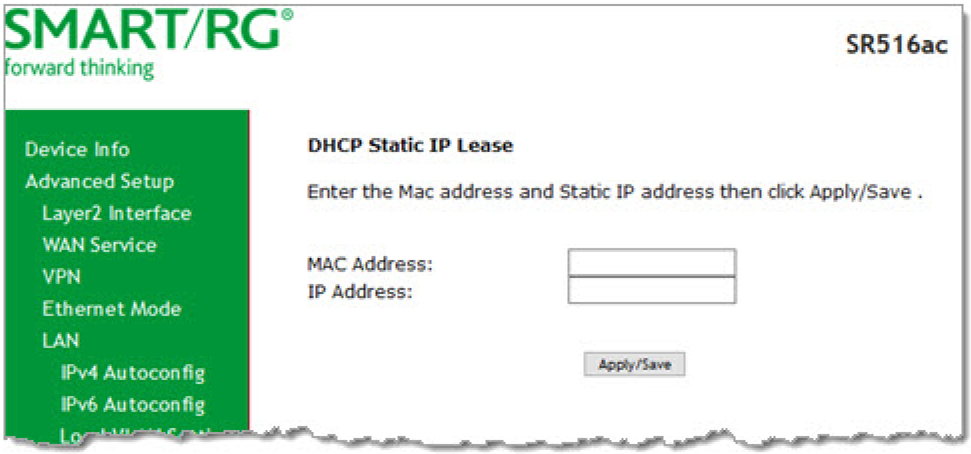
DHCP Advance Setup

This page allows you to enable or disable DHCP for every lan interface.
You must enable **lan ports**.

State|Interface
☑ LAN1
☑ LAN2
☑ LAN3
☑ LAN4

   b. Click the **State** checkboxes as needed to manage DHCP for each LAN interface in the table, and then click **Advanced Setup** > **LAN** > **IPv4 Autoconfig**.

5. To add addresses to the Static IP Lease List:
    a. Click Add Entries below the MAC Address field. The DHCP Static IP Lease page appears.



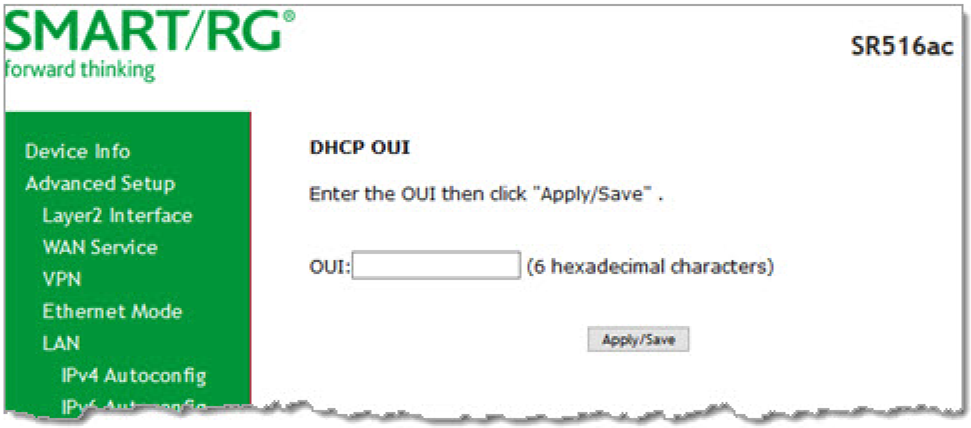
DHCP Static IP Lease

Enter the Mac address and Static IP address then click Apply/Save .

MAC Address:

IP Address:

    b. Enter the MAC address of the LAN host.
    c. Enter the static IP address that is reserved for the host.
    d. Click Apply/Save to apply the settings. You are returned to the LAN Setup page.
6. To remove entries from the Static IP Lease List, click the Remove check box next to the entry and then click Remove Entries.
7. To add OUIs:
    a. Click Add OUI. The DHCP OUI page appears.



DHCP OUI

Enter the OUI then click "Apply/Save" .

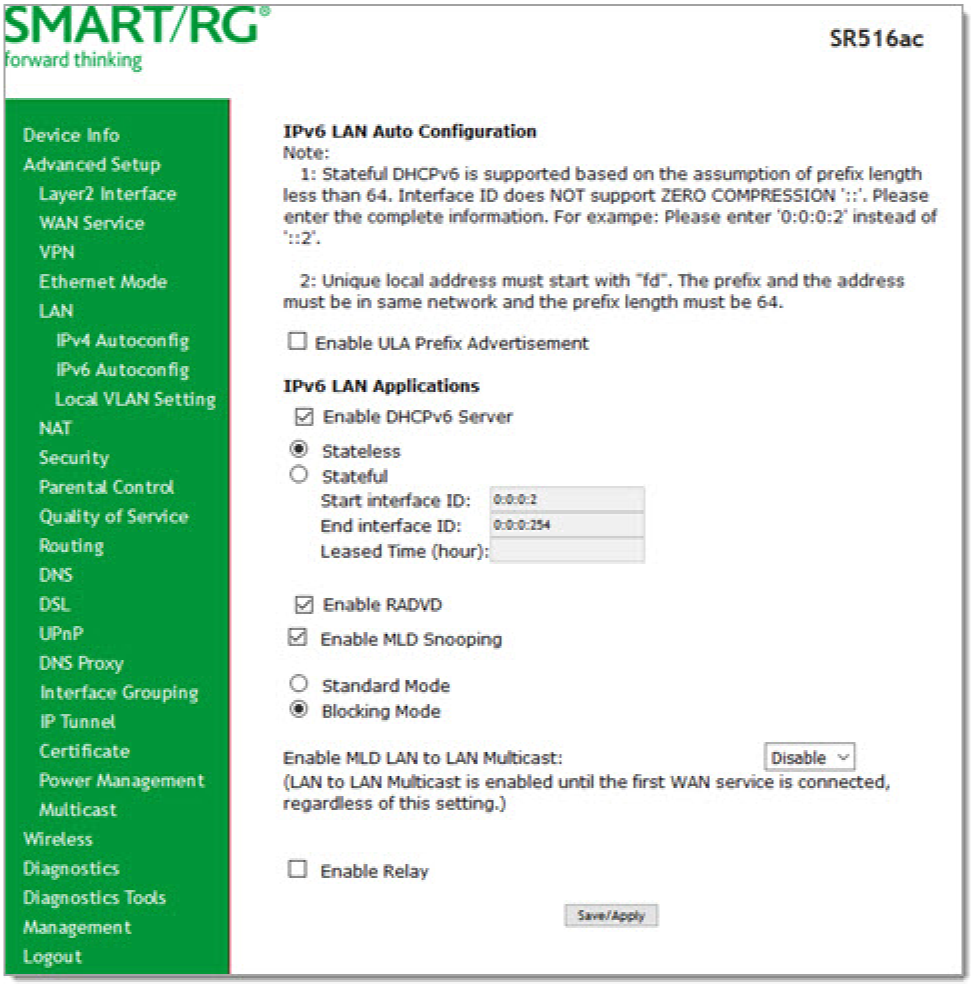
OUI: (6 hexadecimal characters)

    b. Enter the OUI for the DHCP and click Apply/Save.
8. To remove entries from the OUI list, click the Remove check box next to the entry and then click Remove OUI.
9. To define a second IP address and subnet mask for a LAN interface:
    a. Click Configure the second IP Address and Subnet Mask for LAN interface. Additional fields appear.
    b. Enter an IP address and a subnet mask for the LAN interface.
10. Click Apply/Save to apply your settings.

IPv6 Autoconfig

On this page, you can configure your gateway's IPv6 environment.

1. In the left navigation bar, click Advanced Setup > LAN > IPv6 Autoconfig . The following page appears.



IPv6 LAN Auto Configuration

Note:

1: Stateful DHCPv6 is supported based on the assumption of prefix length less than 64. Interface ID does NOT support ZERO COMPRESSION '::'. Please enter the complete information. For exampe: Please enter '0:0:0:2' instead of '::2'.

2: Unique local address must start with "fd". The prefix and the address must be in same network and the prefix length must be 64.

☐ Enable ULA Prefix Advertisement

IPv6 LAN Applications

☑ Enable DHCPv6 Server

● Stateless
○ Stateful

Start interface ID: 0:0:0:2
End interface ID: 0:0:0:254
Leased Time (hour):

☑ Enable RADVD

☑ Enable MLD Snooping

○ Standard Mode
● Blocking Mode

Enable MLD LAN to LAN Multicast: Disable
(LAN to LAN Multicast is enabled until the first WAN service is connected, regardless of this setting.)

☐ Enable Relay

2. To enable advertisement of the ULA prefix, click Enable ULA Prefix Advertisement. Additional fields appear.
3. Modify these and the other fields as needed, using the information in the table below.
4. Click Save/Apply to commit your changes.

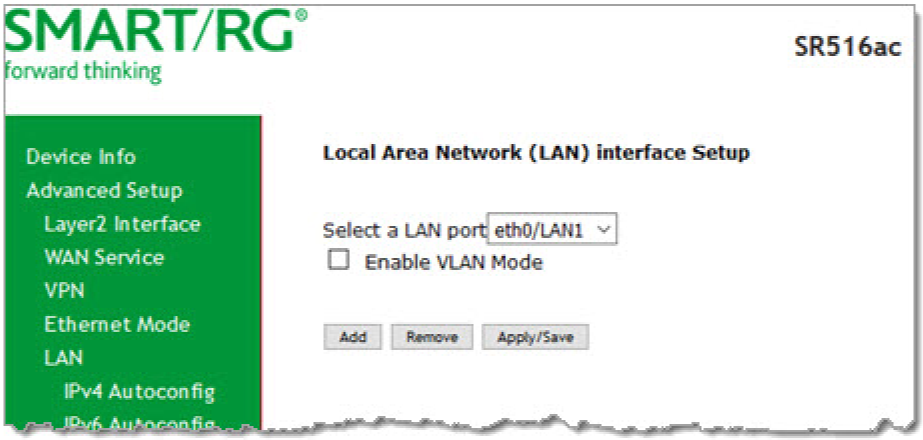
Field Name	Description
Enable ULA Prefix Advertisement	Check this option to enable unique local address (ULA) advertisement on the LAN. Options are **Randomly Generate** and **Statically Configure**. The default is **Randomly Generate** which enables the gateway to generate a random IPv6 prefix. If you select **Statically Configure**, additional fields appear. Modify these fields as needed: • Interface Address: Enter the interface address in IPv6 format (including the prefix length, e.g.,

Field Name	Description
	fd80::1/64. This address must begin with "fd". The prefix length must be "64". The address and prefix must reside on the same network. • Prefix: Enter the prefix, e.g., fd80::/64. • Preferred Life Time: The default is **-1** (no limit). The value in this field must be less than or equal to the value in the Valid Life Time field. • Valid Life Time: The value in this field must be greater than or equal to the value in the Preferred Life Time field. The default is **-1** (no limit).
IPv6 LAN Applications section	
Enable DHCPv6 Server	This option is selected by default. Click this checkbox to *disable* the DHCP v6 feature on the LAN. • **Stateless:** (*Appears when **Enable DHCPv6 Server** is selected*) This option is selected by default. Click to stop inheriting IPV6 address assignments from the WAN IPV6 interface. • **Stateful:** (*Appears when **Enable DHCPv6 Server** is selected*) Identifies the DHCPv6 server given by the LAN IPV6 network as configured with additional options. **Note:** Zero compression is not supported. Make sure to enter zeros between the colons; that is, do not use shorthand notation (enter "0:0:0:2", not ":::2"). Enter values in the following fields: • **Start interface ID**: Enter the beginning IPv6 available addresses for DHCP to assign to LAN devices. • **End interface ID**: Enter the ending IPv6 available addresses for DHCP to assign to LAN devices. • **Leased Time (hour):** Amount of time before a new IPv6 lease is requested by the LAN client.
Enable RADVD	This option is enabled by default. It enables Router Advertisement Daemon (RADVD) service that sends router advertisements to LAN clients. Clear the check box to *disable* RADVD.
Enable MLD Snooping	This option is enabled by default. It enables Multicast Listener Discovery (MLD) snooping to manage IPV6 multicast traffic. If you clear the check box to *disable* this feature, the MLD-related fields are hidden. Options are: • **Standard Mode:** Multicast traffic will flood to all bridge ports when no client subscribes to a multicast group even if IGMP snooping is enabled. • **Blocking Mode:** The multicast data traffic will be blocked and not flood to all bridge ports when there are no client subscriptions to any multicast group. This is the default.
Enable MLD LAN to LAN Multicast	(*Optional*) This option enables LAN-to-LAN Multicast until the first WAN service is connected. Options are **Disable** and **Enable**. The default is **Disable**.
Enable Relay	Click to enable the relay function. Additional fields appear. Do the following: 1. Enter the DHCPv6 Server IP Address. 2. Select a WAN interface. The default is **Default**. 3. Enter a Hop limit.The default is **zero** (**0**).

Local VLAN Setting

On this page, you can select a LAN port and enable VLAN mode on it.

1. In the left navigation menu, click **Advanced Setup** > **LAN** > **Local VLAN Setting**. The following page appears.

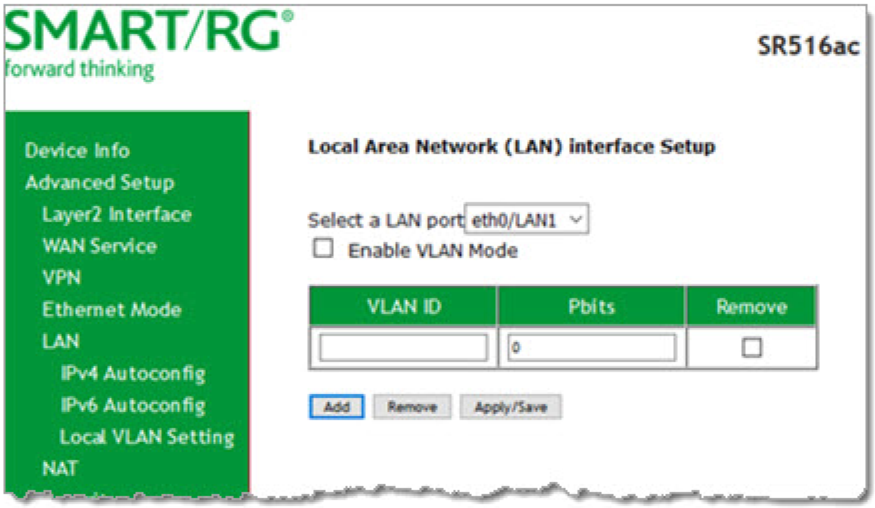


Local Area Network (LAN) interface Setup

Select a LAN port eth0/LAN1

□ Enable VLAN Mode

2. Select the LAN port on which you want to enable VLAN mode.
3. Click **Enable VLAN Mode**.
4. To add a VLAN:
   a. Click **Add**. A table appears where you can enter the details.



Local Area Network (LAN) interface Setup

Select a LAN port eth0/LAN1

□ Enable VLAN Mode

VLAN ID	Pbits	Remove
	0	□

   b. Enter the **VLAN ID**. Options are **1** - **4094**.
   c. In the **Pbits** field, enter the type of bits being passed. Options are **1** - **7**.
5. Click **Apply/Save** to apply your settings.
6. To remove a VLAN entry, click the **Remove** checkbox next to it and then click the **Remove** button.

NAT

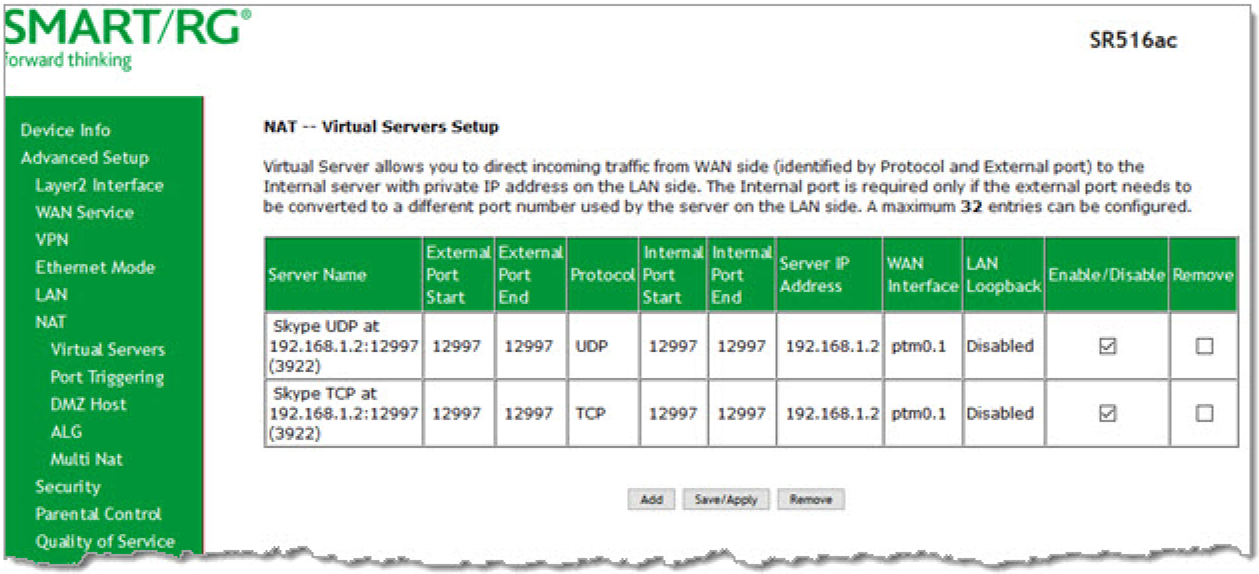
In this section, you can configure the NAT (Network Address Translation) settings.

Virtual Servers

Firewall can prevent unexpected traffic on the Internet from your host on the LAN. The virtual server can create a channel that can pass through the firewall. In that case, the host on the Internet can communicate with a host on your LAN within certain port range.

On this page, you can add or remove virtual server entries.

1. In the left navigation bar, click **Advanced Setup** > **NAT** > **Virtual Servers**. The following page appears.

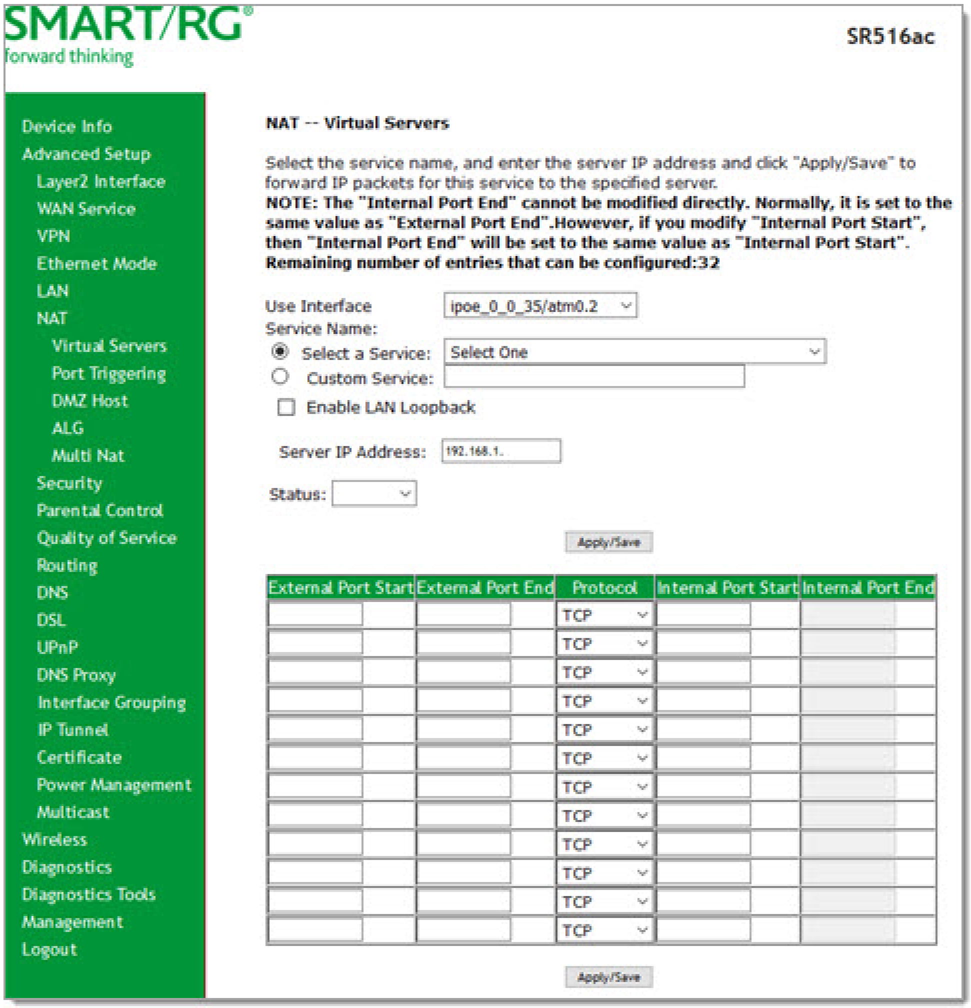


NAT -- Virtual Servers Setup

Virtual Server allows you to direct incoming traffic from WAN side (identified by Protocol and External port) to the Internal server with private IP address on the LAN side. The Internal port is required only if the external port needs to be converted to a different port number used by the server on the LAN side. A maximum **32** entries can be configured.

Server Name	External Port Start	External Port End	Protocol	Internal Port Start	Internal Port End	Server IP Address	WAN Interface	LAN Loopback	Enable/Disable	Remove
Skype UDP at 192.168.1.2:12997 (3922)	12997	12997	UDP	12997	12997	192.168.1.2	ptm0.1	Disabled	☑	□
Skype TCP at 192.168.1.2:12997 (3922)	12997	12997	TCP	12997	12997	192.168.1.2	ptm0.1	Disabled	☑	□

2. To add a virtual server:
   a. Click **Add**. The following page appears.



NAT -- Virtual Servers

Select the service name, and enter the server IP address and click "Apply/Save" to forward IP packets for this service to the specified server.
NOTE: The "Internal Port End" cannot be modified directly. Normally, it is set to the same value as "External Port End".However, if you modify "Internal Port Start", then "Internal Port End" will be set to the same value as "Internal Port Start".
Remaining number of entries that can be configured:32

Use Interface: ipoe_0_0_35/atm0.2
Service Name:
● Select a Service: Select One
○ Custom Service:
□ Enable LAN Loopback

Server IP Address: 192.168.1.

Status:

External Port Start	External Port End	Protocol	Internal Port Start	Internal Port End
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		
		TCP		

   b. Modify the fields as needed, using the information in the table below.

Field	Description
Use Interface	Select the interface that you want to configure.
Service Name	Select or enter the service for which you want to forward IP packets. Options are: • **Select a Service**: Select from services defined for your network. The port table at the bottom of the page is updated with the default port ID defined for the service. • **Custom Service**: Enter a new service name to establish a user service type. You must enter the ports and select a protocol in the table at the bottom of the page.

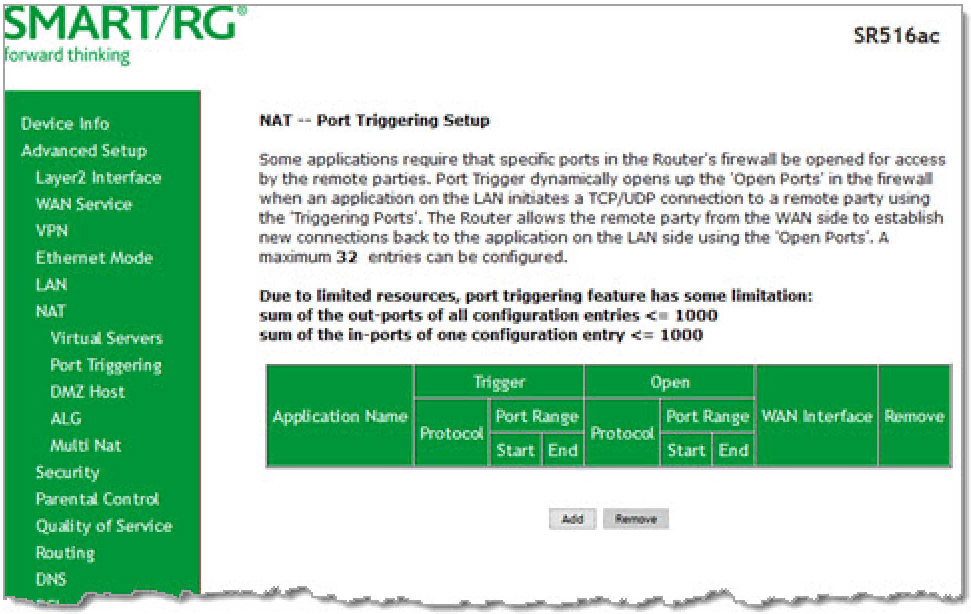
Field	Description
Enable LAN Loop-back	Click to enable on-demand link diagnostics for this server.
Server IP Address	Assign an IP address to this virtual server. The default shown in the field (**192.168.1**) is not a complete address; you must enter the final octet.
External Port Start External Port End	When you select a service, the external port start and end numbers display automatically. Modify them if necessary.
Protocol	Select the protocol for this service. Options are **TCP/UDP**, **TCP**, and **UDP**. The default is **TCP**.
Internal Port Start Internal Port End	When you select a service, the internal port start and end numbers display automatically. Modify them if necessary.

3. In the **Status** field, select **Enable** to enable this server or select **Disable** when you want to save the settings but not enable the NAT configuration.
4. Click **Apply/Save** to save the settings. The server or servers for the selected service appear on the NAT -- Virtual Servers Setup page.
5. To disable a server, click the **Enable/Disable** check box next to it to clear it and then click **Apply/Save**.
6. To remove a server from the list, click the **Remove** check box next to the entry, click the **Remove** button, and then click **Save/Apply**.

Port Triggering

Some applications need some ports to be opened in the firewall for the remote access. When an application initializes a TCP/UDP to connect to a remote user, port triggering dynamically opens the open ports of the firewall.

1. In the left navigation bar, click **Advanced Setup** > **NAT** > **Port Triggering**. The following page appears.



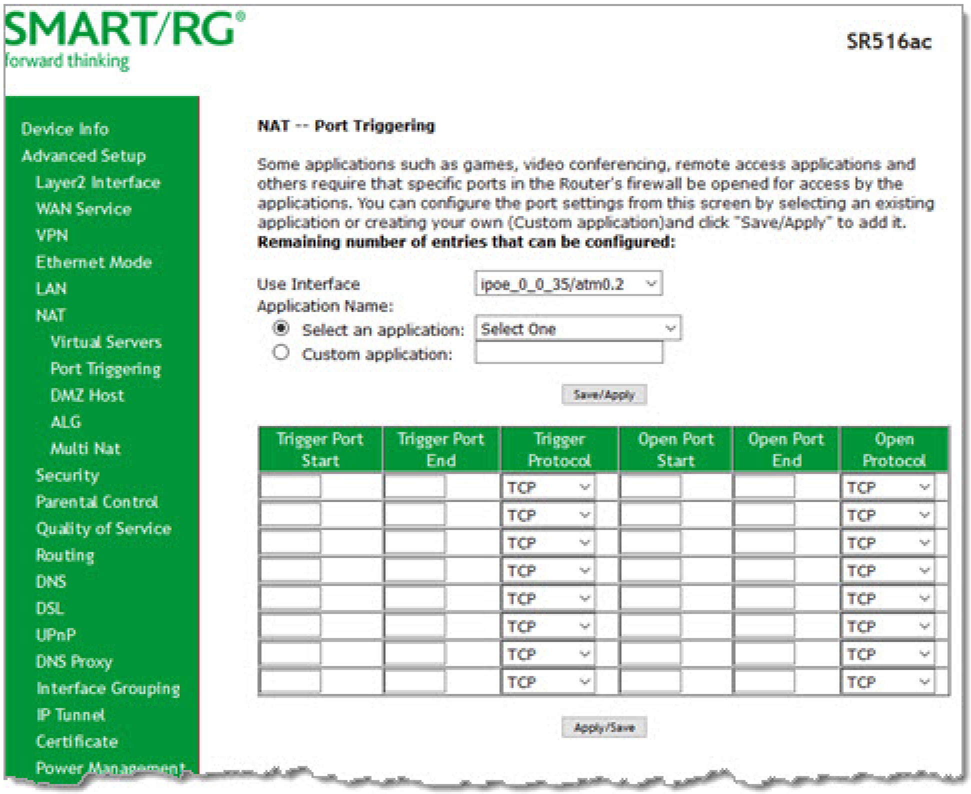
NAT -- Port Triggering Setup

Some applications require that specific ports in the Router's firewall be opened for access by the remote parties. Port Trigger dynamically opens up the 'Open Ports' in the firewall when an application on the LAN initiates a TCP/UDP connection to a remote party using the 'Triggering Ports'. The Router allows the remote party from the WAN side to establish new connections back to the application on the LAN side using the 'Open Ports'. A maximum **32** entries can be configured.

Due to limited resources, port triggering feature has some limitation:
sum of the out-ports of all configuration entries <= 1000
sum of the in-ports of one configuration entry <= 1000

Application Name	Trigger			Open			WAN Interface	Remove
	Protocol	Port Range		Protocol	Port Range			
		Start	End		Start	End		

2. To add a port trigger, click **Add**. The following page appears.



NAT -- Port Triggering

Some applications such as games, video conferencing, remote access applications and others require that specific ports in the Router's firewall be opened for access by the applications. You can configure the port settings from this screen by selecting an existing application or creating your own (Custom application)and click "Save/Apply" to add it.
Remaining number of entries that can be configured:

Use Interface: ipoe_0_0_35/atm0.2

Application Name:

● Select an application: Select One

○ Custom application:

Trigger Port Start	Trigger Port End	Trigger Protocol	Open Port Start	Open Port End	Open Protocol
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP

3. Modify the fields as needed, using the information in the following table.
4. To remove a trigger, click the **Remove** check box next to it and then click the **Remove** button. The list is refreshed.
5. Click **Apply /Save** to implement the settings.

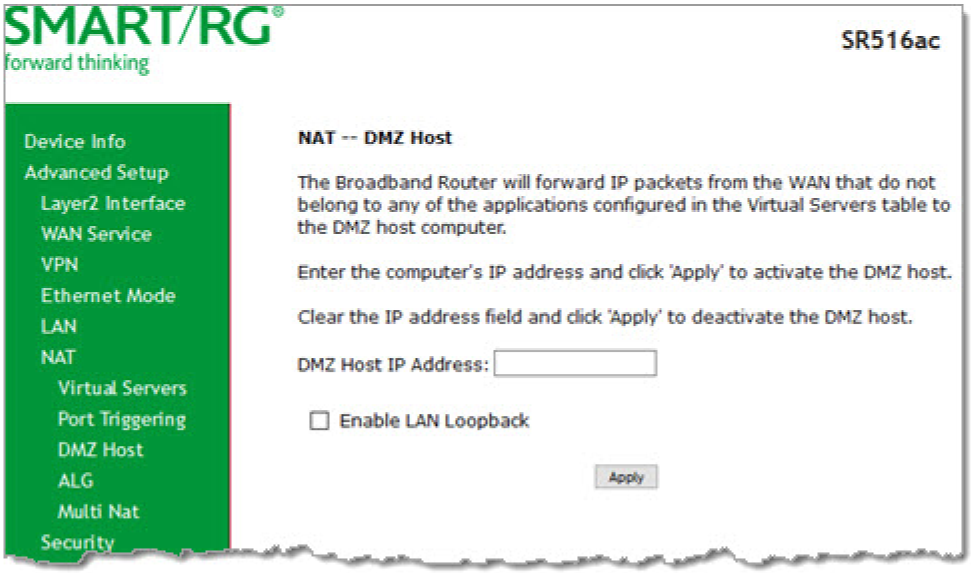
Field Name	Description
Use Interface	Select the interface for which the port triggering rule will apply.
Application Name	Select or enter the application that requires a port trigger. Options are: • **Select an Application:** Select an available application. The Port and Protocol table is populated with the related values. • **Custom Application:** Enter a unique name for the application for which you are creating a port trigger entry. You must enter the ports and select a protocol in the table at the bottom of the page.
Trigger Port Start Trigger Port End	Enter the starting and ending numbers of the range of available outgoing trigger ports. Options are **1 - 65535**. **Note:** You can use a single port number, several port numbers separated by commas, port blocks consisting of two port numbers separated by a dash, or any combination of these, for example 80, 90-140, 180.

Field Name	Description
Trigger Protocol	Select the protocol required by the application that will be using the ports in the specified range. Options are **TCP**, **UDP**, and **TCP/UDP**. The default is **TCP**.
Open Port Start Open Port End	Enter the starting and ending numbers of the range of available incoming ports. Options are **1** - **65535**.
Open Protocol	Select the protocol for the open port. Options are **TCP**, **UDP**, and **TCP/UDP**.

DMZ Host

DMZ allows all the ports of a PC on your LAN to be exposed to the Internet. On this page, you can set the IP address of a PC to be the DMZ host, so that the DMZ host will not be blocked by your firewall.

1. In the left navigation bar, click Advanced Setup > NAT > DMZ Host. The following page appears.



NAT -- DMZ Host

The Broadband Router will forward IP packets from the WAN that do not belong to any of the applications configured in the Virtual Servers table to the DMZ host computer.

Enter the computer's IP address and click 'Apply' to activate the DMZ host.

Clear the IP address field and click 'Apply' to deactivate the DMZ host.

DMZ Host IP Address:

□ Enable LAN Loopback

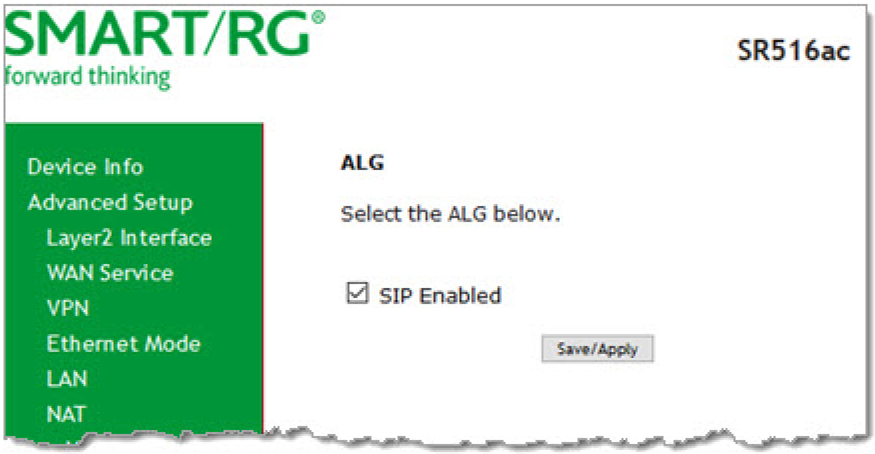
Apply

2. Enter the DMZ Host IP Address.
3. (*Optional*) To enable on-demand link diagnostics, click Enable LAN Loopback.
4. To deactivate a DMZ host, delete the IP address from the DMZ Host IP Address field, and then click Apply.
5. Click Apply to commit the new or changed address.

ALG

On this page, you can enable Session Initiation Protocol (SIP) for your NAT. SIP is a communications protocol for signaling and controlling multimedia communication sessions.

1. In the left navigation bar, click **Advanced Setup** > **NAT** > **ALG**. The following page appears.



ALG

Select the ALG below.

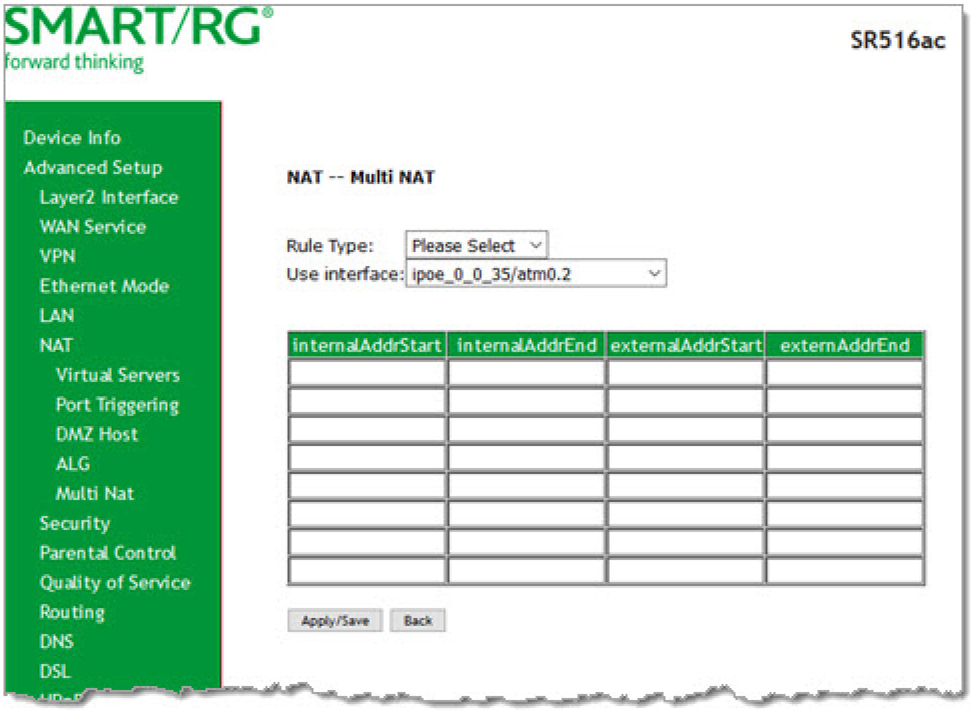
☑ SIP Enabled

2. To *disable* SIP for your NAT, clear the **SIP Enabled** checkbox.
3. Click **Save/Apply** to commit the new or changed address.

Multi NAT

On this page, you can define rules for managing access to your NAT. You can create multiple rules and apply them to as many as eight address ranges.

1. In the left navigation bar, click Advanced Setup > NAT > Multi NAT and then click Add. The following page appears.



NAT -- Multi NAT

Rule Type: Please Select

Use interface: ipoe_0_0_35/atm0.2

internalAddrStart	internalAddrEnd	externalAddrStart	externAddrEnd

2. Modify the fields as needed, using the information in the table below.

Field	Description
Rule Type	Select the type of rule. Options are **One to One**, **One to Many**, **Many to One**, and **Many to Many**.
Use Interface	Select the interface to which this rule will apply.
internalAddrStart	Enter the starting address for the internal server.
internalAddrEnd	Enter the ending address for the internal server.
externalAddrStart	Enter the starting address for the external server.
externalAddrEnd	Enter the ending address for the external server.

3. Click Apply/Save to save and apply the settings. The server or servers for the selected service appear on the MultiNat table page.

Security

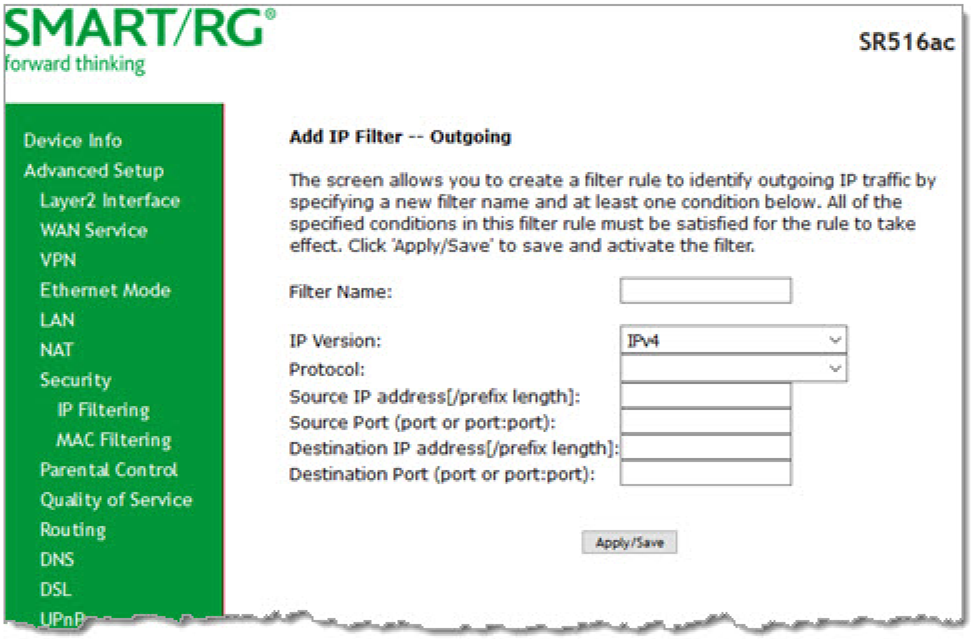
In this section, you can configure the incoming and outgoing IP filtering and MAC filtering.

IP Filtering - Outgoing

On this page, you can add an outgoing filter and prevent certain data being transferred from the LAN to the WAN.

You can define up to 32 outgoing IP filters.

1. In the left navigation bar, click Advanced Setup > Security and then click Add. The following page appears. You can also reach this page by clicking Advanced Setup > Security > IP Filtering > Outgoing.



Add IP Filter -- Outgoing

The screen allows you to create a filter rule to identify outgoing IP traffic by specifying a new filter name and at least one condition below. All of the specified conditions in this filter rule must be satisfied for the rule to take effect. Click 'Apply/Save' to save and activate the filter.

Filter Name:

IP Version: IPv4

Protocol:

Source IP address[/prefix length]:

Source Port (port or port:port):

Destination IP address[/prefix length]:

Destination Port (port or port:port):

2. Fill in the fields, using the information in the table below.
3. Click Apply/Save to commit the completed entry.

The fields on this page are defined below.

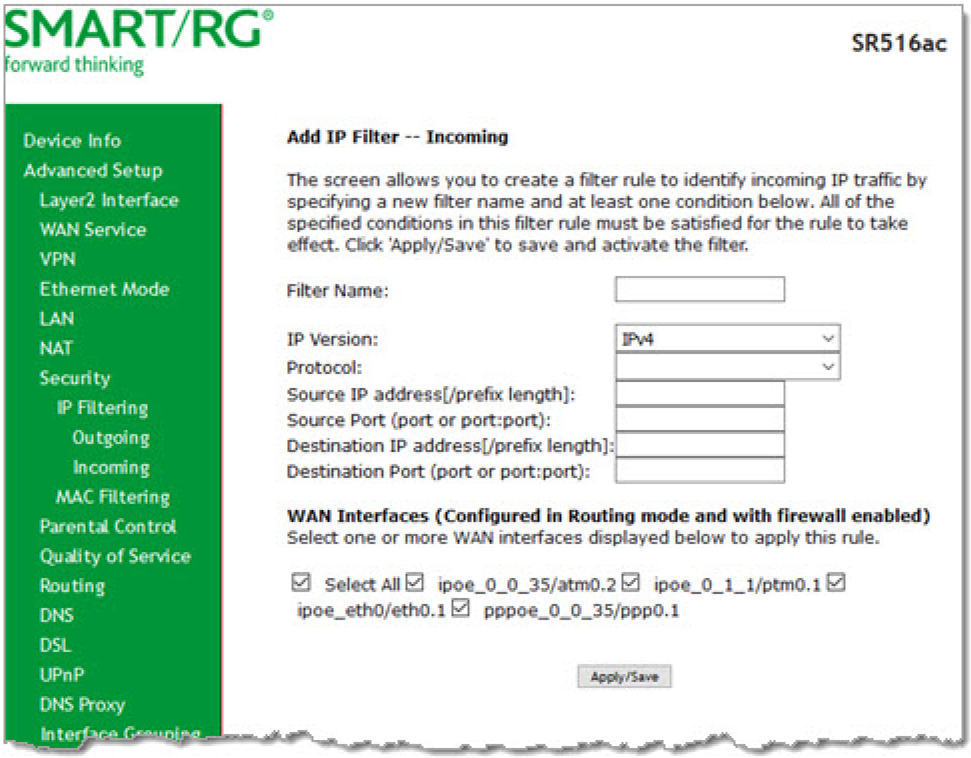
Field Name	Description
Filter Name	Enter a descriptive name for this filter. No special characters or spaces are allowed.
IP Version	For the filter to be configured and effective for IPV6, the gateway must be installed on a network that is either a pure IPV6 network (with that protocol enabled) or is both IPV4 and IPV6 dual protocol enabled/-configured. Options are **IPv4** and **IPv6**. The default is **IPv4**. If you select **IPV6**, Source IP address and Destination IP address must be specified in IPV6 format, i.e., an IPV6-compliant, hexadecimal address such as: 2001:0DB8:AC10:FE01:0000:0000:0000:0001.
Protocol	Select the protocol profile for the filter you are defining. TCP/UDP is most commonly used. Options are **TCP/UDP**, **TCP**, **UDP**, and **ICMP**.
Source IP address [/prefix length]	Enter the source IP address of a LAN side host for which you wish to block outgoing traffic using the specified protocol(s). **Note:** The address specified here can be a particular address or a block of IP addresses on a given network subnet. This is done by appending the associated routing "prefix" length decimal value (preceded with the slash) to the addresses.
Source Port (port	Set the source host port (or range of ports) for the above host (or range of hosts) to define the ports profile

Field Name	Description
or port:port)	for which egress traffic will be blocked from reaching the specified destination(s).
Destination IP address [/prefix length]	Enter the destination IP address of a LAN side host for which you wish to filter (block) outgoing traffic using the specified protocol(s). **Note:** The address specified here can be a particular address or a block of IP address on a given network subnet. This is done through appending the address with the associated routing "/prefix" length decimal value (preceded with the slash).
Destination Port (port or port:port)	Set the destination host port (or range of ports) for the above host (or range of hosts) to define the destination port profile for which egress traffic will be blocked, e.g., for a computer external to the local network.

IP Filtering - Incoming

On this page, you can add an incoming filter and prevent certain data being transferred from the WAN to the LAN.

1. In the left navigation bar, click Advanced Setup > Security > IP Filtering > Incoming and then click Add. The following page appears.



Add IP Filter -- Incoming

The screen allows you to create a filter rule to identify incoming IP traffic by specifying a new filter name and at least one condition below. All of the specified conditions in this filter rule must be satisfied for the rule to take effect. Click 'Apply/Save' to save and activate the filter.

Filter Name:	
IP Version:	IPv4
Protocol:	
Source IP address[/prefix length]:	
Source Port (port or port:port):	
Destination IP address[/prefix length]:	
Destination Port (port or port:port):	

WAN Interfaces (Configured in Routing mode and with firewall enabled)
Select one or more WAN interfaces displayed below to apply this rule.

☑ Select All ☑ ipoe_0_0_35/atm0.2 ☑ ipoe_0_1_1/ptm0.1 ☑ ipoe_eth0/eth0.1 ☑ pppoe_0_0_35/ppp0.1

2. Fill in the fields, using the information in the table below. The Filter Name and Protocol fields are required.
3. Click Apply/Save to commit your changes.

The fields on this page are defined below.

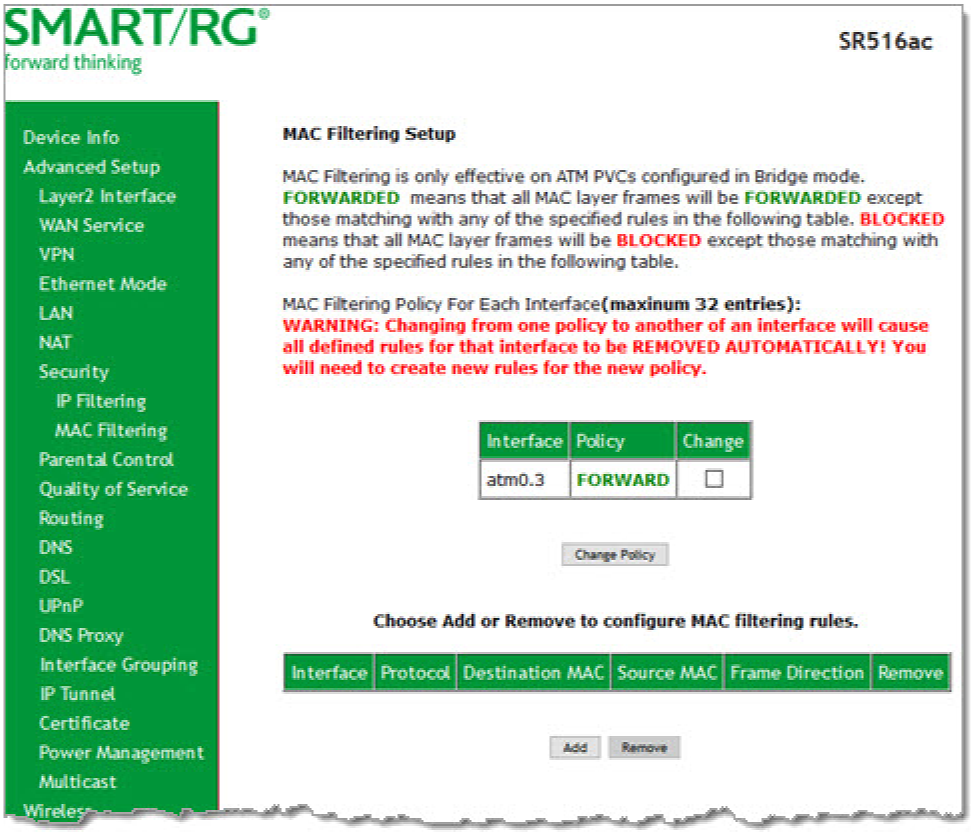
Field Name	Description
Filter Name	Enter a descriptive name for this filter. No special characters or spaces are allowed.
IP Version	For the filter to be configured and effective for IPV6, the gateway must be installed on a network that is either a pure IPV6 network (with that protocol enabled) or is both IPV4 and IPV6 dual protocol enabled/configured. Options are **IPv4** and **IPv6**. The default is **IPv4**. If you select **IPV6**, Source IP address and Destination IP address must be specified in IPV6 format, i.e., an IPV6-compliant, hexadecimal address such as: 2001:0DB8:AC10:FE01:0000:0000:0000:0001.
Protocol	Select the protocol to be associated with this incoming filter. Options are **TCP/UDP**, **TCP**, **UDP**, or **ICMP**.
Source IP address [/prefix length]	Enter the source IP address for this filter. For IPv6, enter the prefix as well.
Source Port (port or port:port)	Enter a source port number or range (*xxxxx:yyyyy*).
Destination IP address [/prefix length]	Enter the destination IP address for this filter. For IPv6, enter the prefix as well.
Destination Port (port or port:port)	Enter destination port number or range (*xxxxx:yyyyy*).
WAN Interfaces	Click to apply this rule to all WAN interfaces or only certain types. Options are **Select All** or select any of the types defined for your network. The default is **Select All**.

MAC Filtering

On this page, you can manage MAC filtering for your gateway.

Your gateway can block or forward packets based on the originating device. This MAC filtering feature is available only in Bridge mode. For other modes, similar functionality is available via IP Filtering.

1. In the left navigation bar, click **Advanced Setup** > **Security** > **MAC Filtering**. The following page appears.



MAC Filtering Setup

MAC Filtering is only effective on ATM PVCs configured in Bridge mode. **FORWARDED** means that all MAC layer frames will be **FORWARDED** except those matching with any of the specified rules in the following table. **BLOCKED** means that all MAC layer frames will be **BLOCKED** except those matching with any of the specified rules in the following table.

MAC Filtering Policy For Each Interface**(maxinum 32 entries):**
WARNING: Changing from one policy to another of an interface will cause all defined rules for that interface to be REMOVED AUTOMATICALLY! You will need to create new rules for the new policy.

Interface	Policy	Change
atm0.3	FORWARD	□

Choose Add or Remove to configure MAC filtering rules.

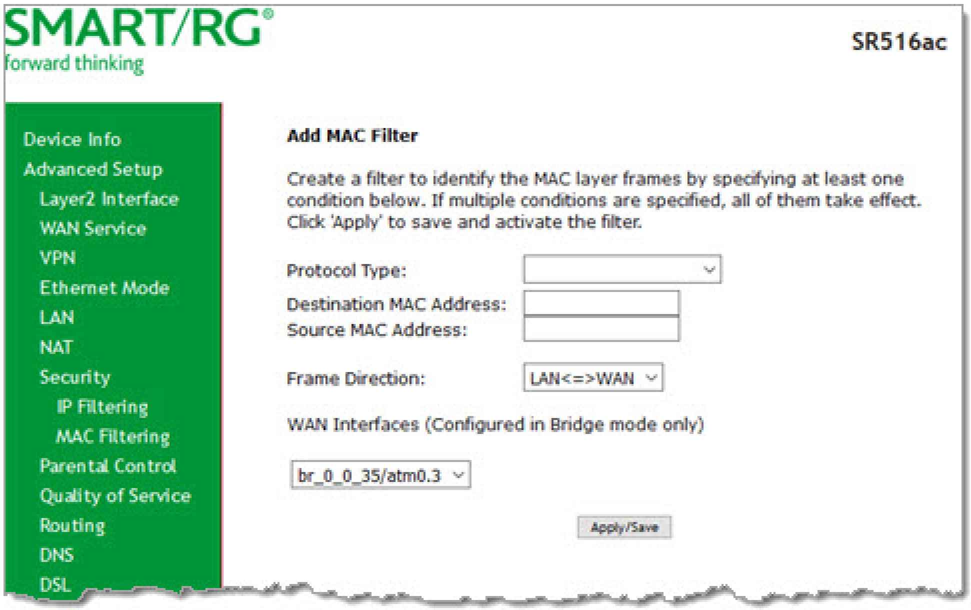
Interface	Protocol	Destination MAC	Source MAC	Frame Direction	Remove

2. To modify settings for an existing policy, click the **Change** checkbox next to it, and then click **Change Policy**. Options are **BLOCKED** and **FORWARD**. The page refreshes, showing that the action has changed. The **Change Policy** button acts like a toggle switch, clicking it switches the policy from **BLOCKED** to **FORWARD** and back again.
3. To add a MAC filtering rule, click **Add** and follow the instructions in Adding a MAC Filter.
4. To remove a rule, click the **Remove** checkbox next to the rule and click **Remove**.
5. When your changes are completed, click **Apply/Save** to commit your changes.

Adding a MAC Filter

You cannot edit rules but you can add new ones and then remove the obsolete ones.

1. On the MAC Filtering Setup page, click **Add**. The following page appears.



Add MAC Filter

Create a filter to identify the MAC layer frames by specifying at least one condition below. If multiple conditions are specified, all of them take effect. Click 'Apply' to save and activate the filter.

Protocol Type:

Destination MAC Address:

Source MAC Address:

Frame Direction: LAN<=>WAN

WAN Interfaces (Configured in Bridge mode only)

br_0_0_35/atm0.3

2. Fill in the fields, using the information provided in the following table. The **Protocol** field is required.
3. Click **Apply/Save** to commit your changes.

Field Name	Description
Protocol Type	Select the protocol associated with the device at the destination MAC address. Options are **PPPoE**, **IPv4**, **IPv6**, **AppleTalk**, **IPX**, **NetBEUI**, and **IGMP**.
Destination MAC Address	Enter the MAC address of the device that you want to associate with this filter.
Source MAC Address	Enter the MAC address of the device that originates the requests intended for the device associated with the **Destination MAC Address**.
Frame Direction	Select the incoming/outgoing packet interface. Options are **LAN<=>WAN**, **WAN=>LAN**, and **LAN=>WAN**. The default is **LAN<=>WAN** (both directions).
WAN Interfaces	Select the WAN interface(s) for which the filter should apply. Only interfaces configured for Bridge mode are available.

Parental Control

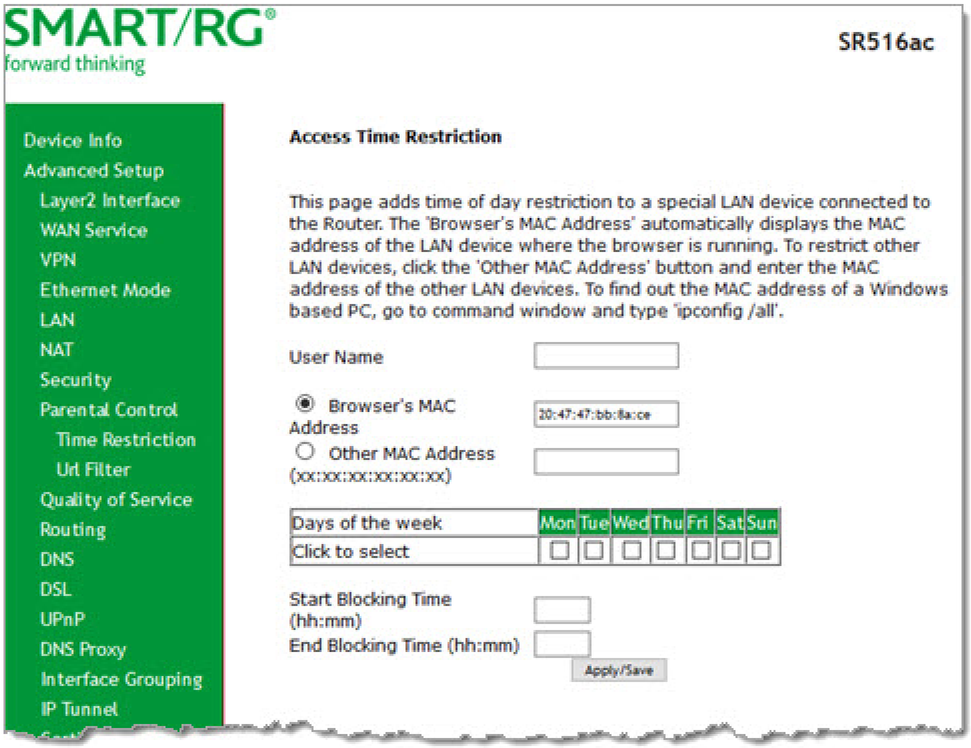
In this section, you can manage time restrictions and block or allow specific URLs.

Time Restriction

On this page, you can control time restriction settings for a LAN device that connects to the gateway.

Note: Before you can create a time restriction rule, the gateway's time must be set. You can do this on the Management > Internet Time page.

1. In the left navigation menu, click **Advanced Setup** > **Parental Control** and then click **Add**. The following page appears.



Access Time Restriction

This page adds time of day restriction to a special LAN device connected to the Router. The 'Browser's MAC Address' automatically displays the MAC address of the LAN device where the browser is running. To restrict other LAN devices, click the 'Other MAC Address' button and enter the MAC address of the other LAN devices. To find out the MAC address of a Windows based PC, go to command window and type 'ipconfig /all'.

User Name

● Browser's MAC Address: 20:47:47:bb:8a:ce

○ Other MAC Address (xx:xx:xx:xx:xx:xx)

Days of the week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Click to select	□	□	□	□	□	□	□

Start Blocking Time (hh:mm)

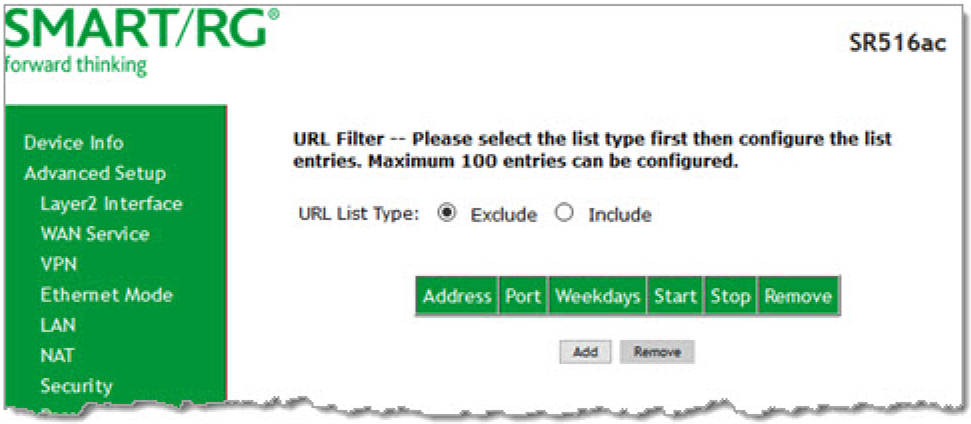
End Blocking Time (hh:mm)

2. Enter the user name for which this rule applies.
3. (*Optional*) Enter an additional MAC address by clicking **Other MAC Address** and entering the address in the adjacent field.
4. Select the days of the week when this rule should apply.
5. Enter the starting and ending times for the periods that you want blocked. Use 24-hour format.
6. Click **Apply/Save** to implement the settings. You are returned to the Parental Control > Access Time Restriction page.

Url Filter

On this page, you can prevent the LAN users from accessing some Web sites in the WAN.

1. 1. Click Advanced Setup > Parental Control > Url Filter, and the following page appears.

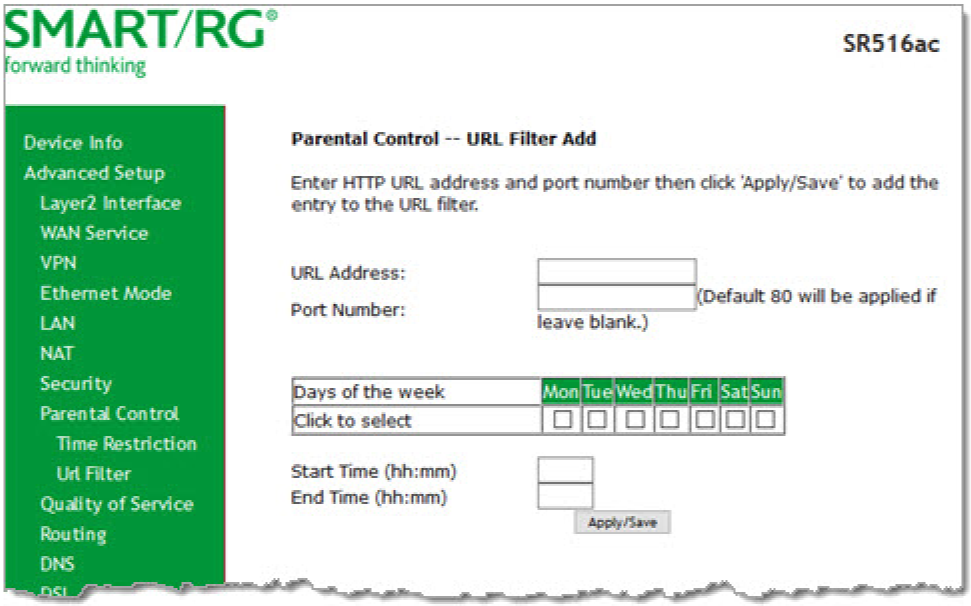


URL Filter -- Please select the list type first then configure the list entries. Maximum 100 entries can be configured.

URL List Type: ● Exclude ○ Include

Address	Port	Weekdays	Start	Stop	Remove

2. Select whether to exclude or include the URLs in the list you are going to create. If you select **Exclude**, users cannot access the URLs in the list. If you select **Include**, users can access the URLs in the list.
3. To create the list of URLs, click Add. The following page appears.



Parental Control -- URL Filter Add

Enter HTTP URL address and port number then click 'Apply/Save' to add the entry to the URL filter.

URL Address:

Port Number: (Default 80 will be applied if leave blank.)

Days of the week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Click to select	□	□	□	□	□	□	□

Start Time (hh:mm)

End Time (hh:mm)

4. Enter the URL address and its corresponding port number. For example, enter http://www.google.com as the URL address and 80 as the port number. If you leave the Port Number field blank, the default port number of **80** is used.
5. Select the days of the week when this rule will apply.
6. Enter the starting and ending time periods when this rule should be active. Use 24-hour format.
7. Click Apply/Save to save your changes. You are returned to the Parental Control > URL Filter page.

Quality of Service

Quality of Service (QoS) enables prioritization of Internet content to help ensure the best possible performance. This is particularly useful for streaming video and audio content with minimized potential for drop-outs. QoS becomes significant when the sum of all traffic (audio, video, data) exceeds the capacity of the line.

In this section, you can disable/enable QoS and configure queues and classification rules.

Quality of Service

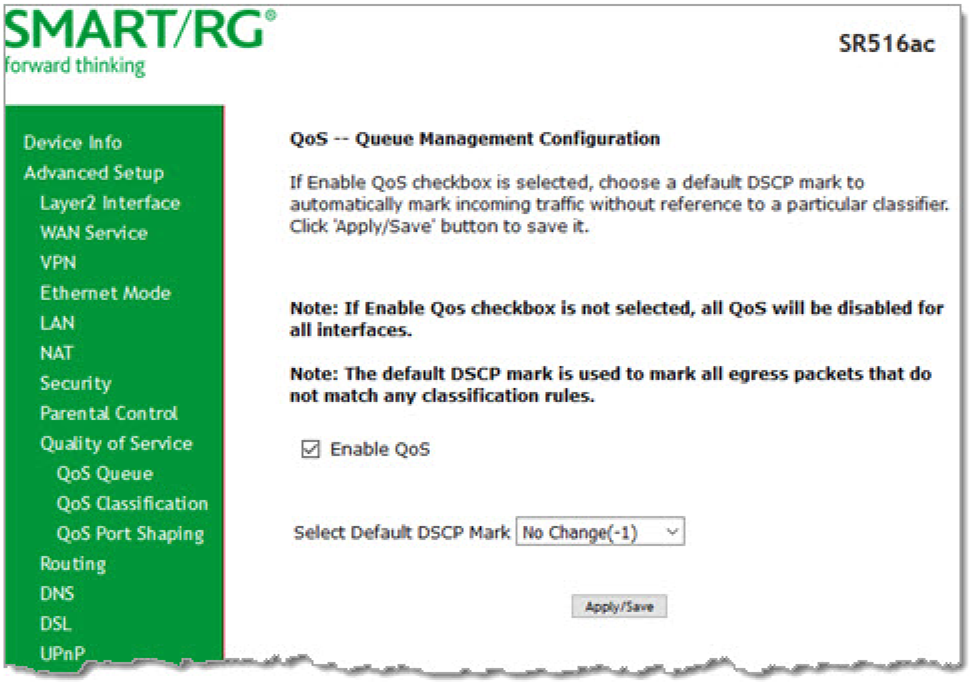
On this page, you can enable or disable QoS and set the DSCP Mark classification.

The maximum number of queues that can be configured vary by mode, as shown below.

Mode	Maximum # of queues
ATM	16
Ethernet & Ethernet WAN	8 per interface
PTM	8

Note: Queues for wireless connections (e.g., WMM Voice Priority) are shown only when wireless is enabled. If the **WMM Advertise** option on the Wireless > Basic Setup page is disabled, assigning classifications to wireless traffic has no effect.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service**. The following page appears. The Quality of Service feature is enabled by default.



QoS -- Queue Management Configuration

If Enable QoS checkbox is selected, choose a default DSCP mark to automatically mark incoming traffic without reference to a particular classifier. Click 'Apply/Save' button to save it.

Note: If Enable Qos checkbox is not selected, all QoS will be disabled for all interfaces.

Note: The default DSCP mark is used to mark all egress packets that do not match any classification rules.

☑ Enable QoS

Select Default DSCP Mark No Change(-1)

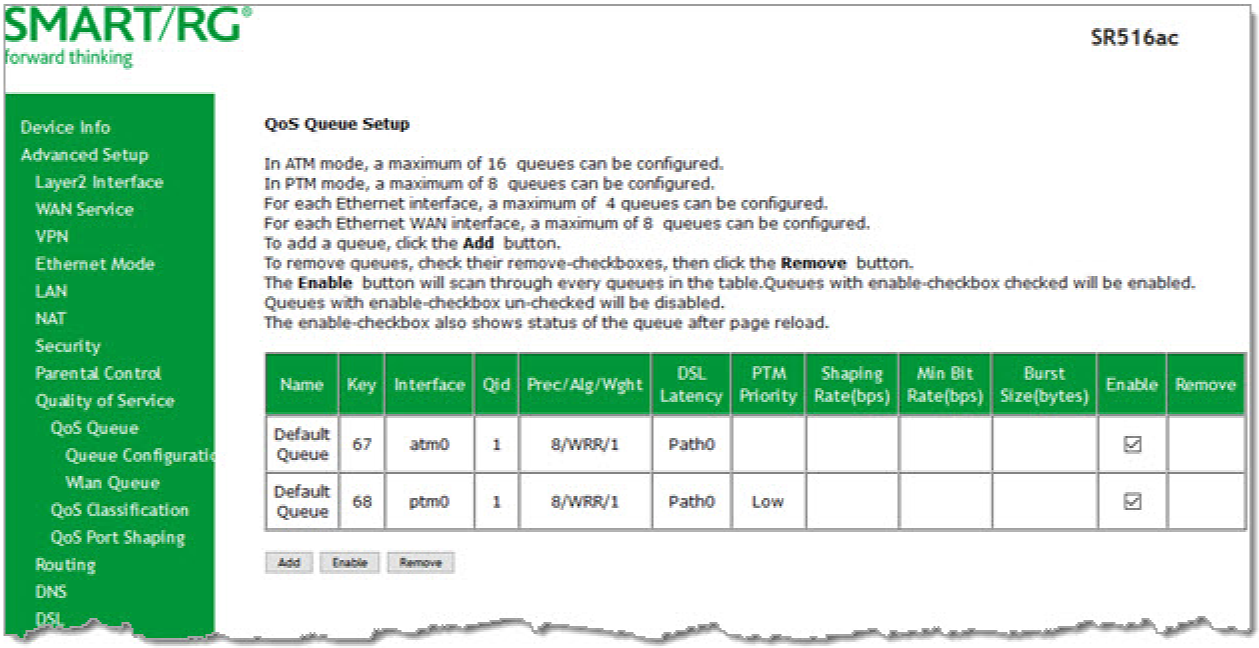
2. To *disable* QoS for *ALL* interfaces, click the **Enable QoS** check box to clear it.

3. (*Optional*) Select the default DSCP Mark (Differentiated Services Code Point) classification value to be used. The default is **No Change(-1)**.
4. Click Apply/Save to save your settings.

QoS Queue

On this page, you can configure a queue and add it to a selected Layer2 interface. You can also edit and delete queues. A number of standard queues are already defined. You may have to remove queues that you don't need in order to create the desired queues.

1. In the left navigation bar, click Advanced Setup > Quality Of Service > QoS Queue. The following page appears.

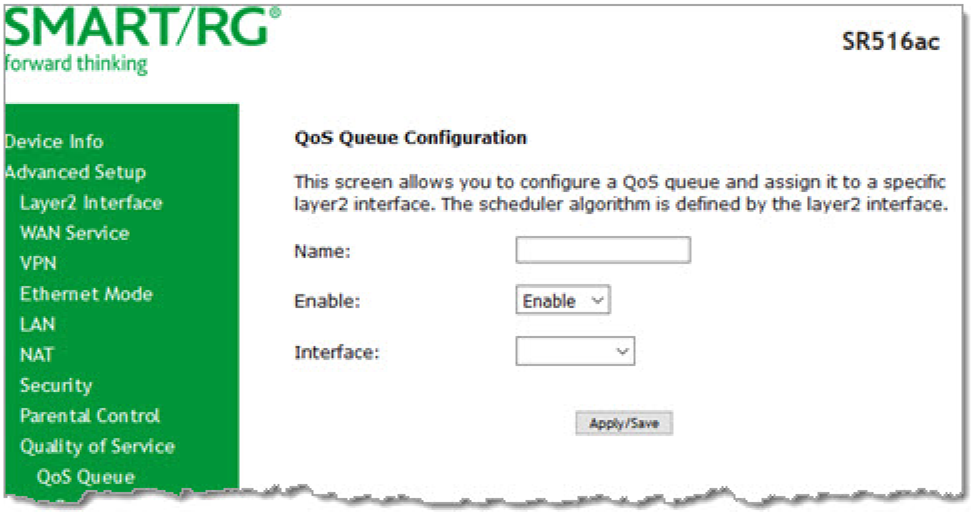


QoS Queue Setup

In ATM mode, a maximum of 16 queues can be configured.
In PTM mode, a maximum of 8 queues can be configured.
For each Ethernet interface, a maximum of 4 queues can be configured.
For each Ethernet WAN interface, a maximum of 8 queues can be configured.
To add a queue, click the **Add** button.
To remove queues, check their remove-checkboxes, then click the **Remove** button.
The **Enable** button will scan through every queues in the table.Queues with enable-checkbox checked will be enabled.
Queues with enable-checkbox un-checked will be disabled.
The enable-checkbox also shows status of the queue after page reload.

Name	Key	Interface	Qid	Prec/Alg/Wght	DSL Latency	PTM Priority	Shaping Rate(bps)	Min Bit Rate(bps)	Burst Size(bytes)	Enable	Remove
Default Queue	67	atm0	1	8/WRR/1	Path0					☑	
Default Queue	68	ptm0	1	8/WRR/1	Path0	Low				☑	

2. To add a queue:
   a. Click Add at the bottom of the table. The following page appears.



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QoS Queue Configuration

This screen allows you to configure a QoS queue and assign it to a specific layer2 interface. The scheduler algorithm is defined by the layer2 interface.

Name:

Enable: Enable

Interface:

   b. Fill in the fields, using the information in the following table. The visible fields vary by interface and queue precedence selections. In most cases, you can use the default values.
   c. Click Apply/Save. You are returned to the Qos Queue Setup page.
3. To remove a queue, click the Remove checkbox to the right of the entry and then click the Remove button at the bottom of the page.
4. Click Apply/Save to save your settings.

The applicable fields are explained below.

Field Name	Description
Name	Enter a descriptive name for this configuration.
Enable	Select to enable or disable this QoS queue for the interface that you select. Options are **Enable** and **Disable**. The default is **Enable**.
Interface	Select the Layer 2 interface to be associated with the defined QoS queue, e.g., eth0 or ptm01.
Queue Precedence	*(Appears when atm, eth or ptm interfaces are selected in the Interface field)* Select the priority value to be associated with the defined QoS queue. Options vary by interface and can include **1(SP)**, **1 (WRR|WFQ)**, **2(SP)**, **3(WRR)**, 4**(SP|WRR|WFQ)**, and so on. **Note:** The lower the precedence value, the higher priority the queue is given. Traffic is given priority based on the combined values from this field and Queue Weight field.
The following fields become visible based on your selections in the Interface and Queue Precedence fields. Which fields appear vary by your selections. The fields are listed below in alphabetical order.	
DSL Latency	This option is set to **Path0** by default and cannot be changed. No error correction is performed. This can reduce latency on error-free lines.
Minimum Rate	Enter the minimum shaping rate defined for packets in QoS queues. Options are **1** - **100000** Kbps. The

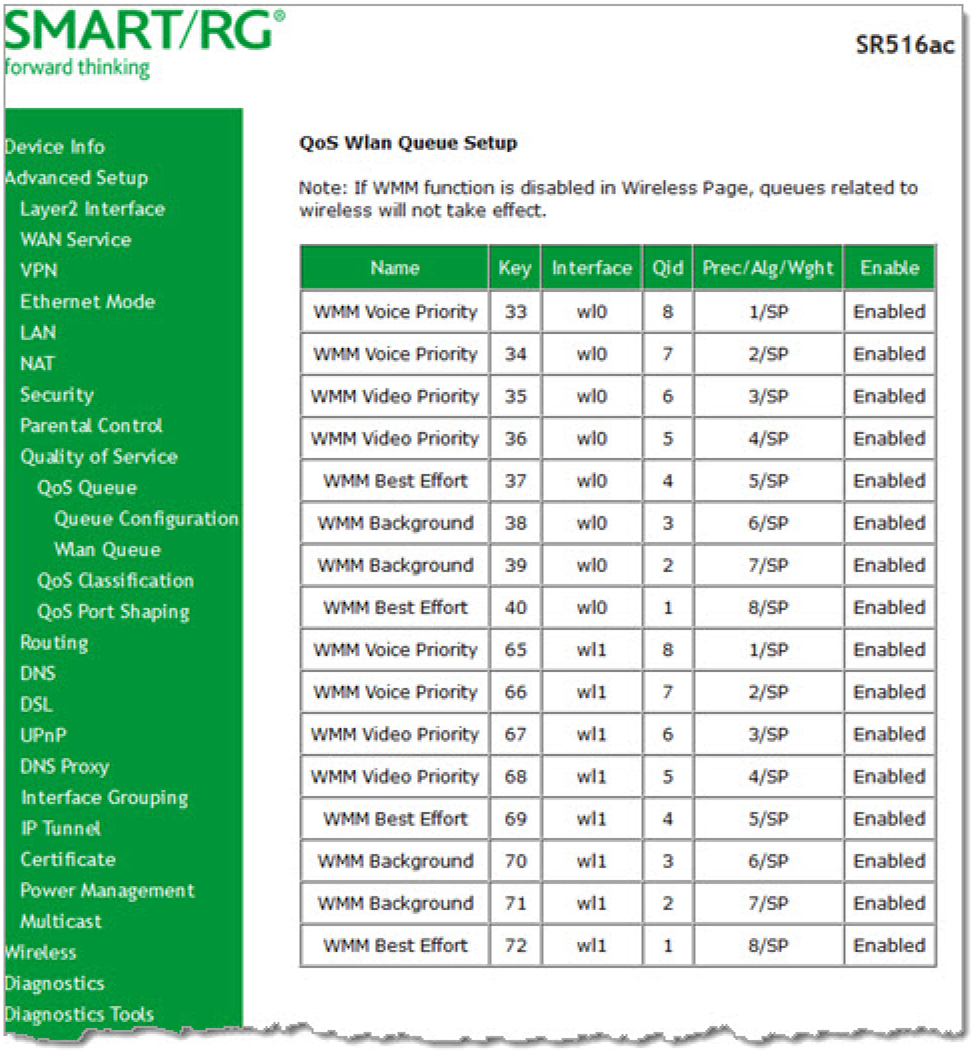
Field Name	Description
	default is **-1** (no minimum shaping rate).
PTM Priority	Select the priority for this queue. Options are **Low** and **High**. The default is **Low**.
Queue Weight	Enter the weighting value to associate with this queue. Options are **1** - **63**. The default is **1**. **Note:** The higher the weighting value, the more frames that are sent proportionately given the WRR algorithm employed. Traffic is given priority based on the combined values from this field and the **Queue Precedence** field.
Scheduler Algorithm	Select an algorithm for data priority in queues. Options are: • **Weighted Round Robin:** Applies a fair round robin scheme weighting that is effective for networks with fixed packet sizes, e.g., ATM networks. • **Weighted Fair Queuing:** Applies a fair queuing weighting scheme via allowing different sessions to have different service shares for improved data packets flow in networks with variable packet size, e.g., PTM/IP networks.
Shaping Burst Size	Enter the shaping burst size to be applied to packets in the defined queue. Options are **1600 bytes** or greater.
Shaping Rate	Enter the shaping rate for packets in QoS queues. Options are **1** - **100000** Kbps. The default is **-1** (no minimum shaping).

WLAN Queue

On this page, you can view the WLAN queues defined for your network.

Note: Make sure that wireless connection is active by going to **Wireless** and clicking **Apply/Save**.

In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Queue** > **Wlan Queue**. The following page appears.



QoS Wlan Queue Setup

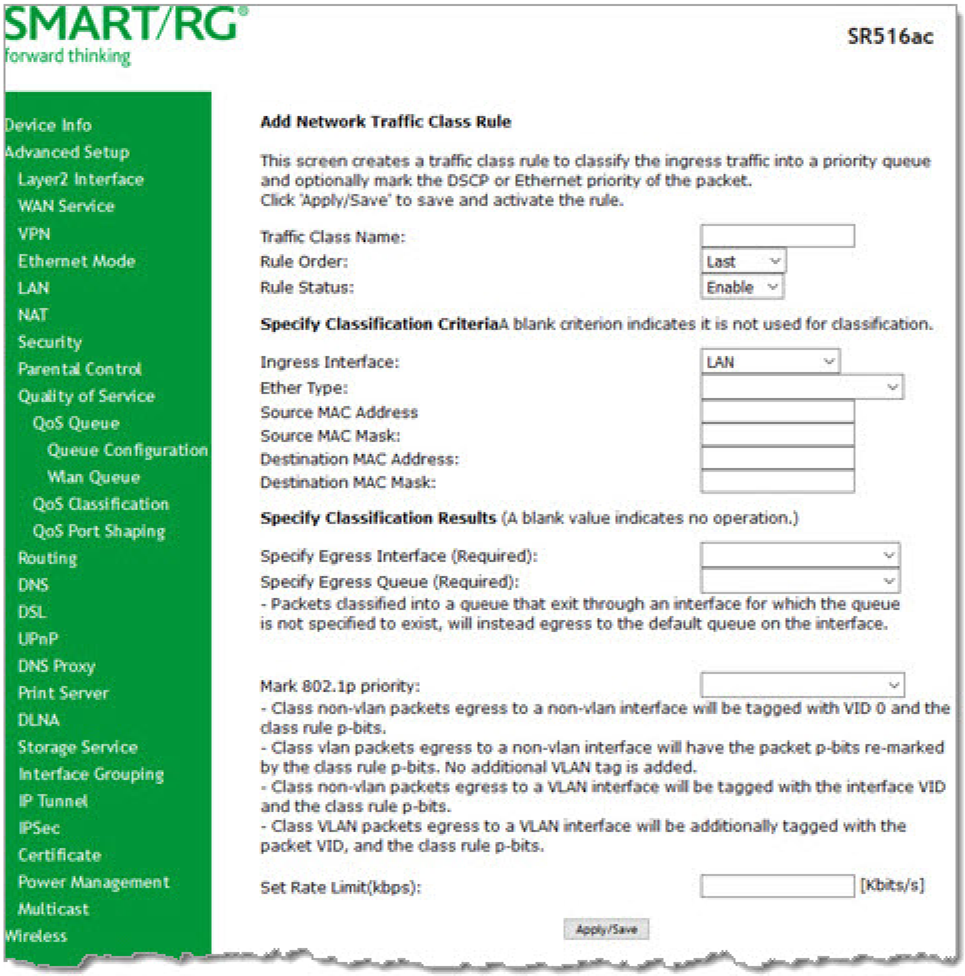
Note: If WMM function is disabled in Wireless Page, queues related to wireless will not take effect.

Name	Key	Interface	Qid	Prec/Alg/Wght	Enable
WMM Voice Priority	33	wl0	8	1/SP	Enabled
WMM Voice Priority	34	wl0	7	2/SP	Enabled
WMM Video Priority	35	wl0	6	3/SP	Enabled
WMM Video Priority	36	wl0	5	4/SP	Enabled
WMM Best Effort	37	wl0	4	5/SP	Enabled
WMM Background	38	wl0	3	6/SP	Enabled
WMM Background	39	wl0	2	7/SP	Enabled
WMM Best Effort	40	wl0	1	8/SP	Enabled
WMM Voice Priority	65	wl1	8	1/SP	Enabled
WMM Voice Priority	66	wl1	7	2/SP	Enabled
WMM Video Priority	67	wl1	6	3/SP	Enabled
WMM Video Priority	68	wl1	5	4/SP	Enabled
WMM Best Effort	69	wl1	4	5/SP	Enabled
WMM Background	70	wl1	3	6/SP	Enabled
WMM Background	71	wl1	2	7/SP	Enabled
WMM Best Effort	72	wl1	1	8/SP	Enabled

QoS Classification

On this page, you can create classifications (traffic class rules) for assigning ingress traffic to a priority queue.

1. In the left navigation bar, click Advanced Setup > Quality Of Service > QoS Classification and then click Add. The following page appears. A maximum of 32 entries can be configured.



Add Network Traffic Class Rule

This screen creates a traffic class rule to classify the ingress traffic into a priority queue and optionally mark the DSCP or Ethernet priority of the packet.
Click 'Apply/Save' to save and activate the rule.

Traffic Class Name:
Rule Order: Last
Rule Status: Enable

Specify Classification CriteriaA blank criterion indicates it is not used for classification.

Ingress Interface: LAN
Ether Type:
Source MAC Address
Source MAC Mask:
Destination MAC Address:
Destination MAC Mask:

Specify Classification Results (A blank value indicates no operation.)

Specify Egress Interface (Required):
Specify Egress Queue (Required):
- Packets classified into a queue that exit through an interface for which the queue is not specified to exist, will instead egress to the default queue on the interface.

Mark 802.1p priority:
- Class non-vlan packets egress to a non-vlan interface will be tagged with VID 0 and the class rule p-bits.
- Class vlan packets egress to a non-vlan interface will have the packet p-bits re-marked by the class rule p-bits. No additional VLAN tag is added.
- Class non-vlan packets egress to a VLAN interface will be tagged with the interface VID and the class rule p-bits.
- Class VLAN packets egress to a VLAN interface will be additionally tagged with the packet VID, and the class rule p-bits.

Set Rate Limit(kbps): [Kbits/s]

2. Fill in the fields, using the information in the table below.
3. Click Apply/Save to commit your changes.

The fields on this page are defined below.

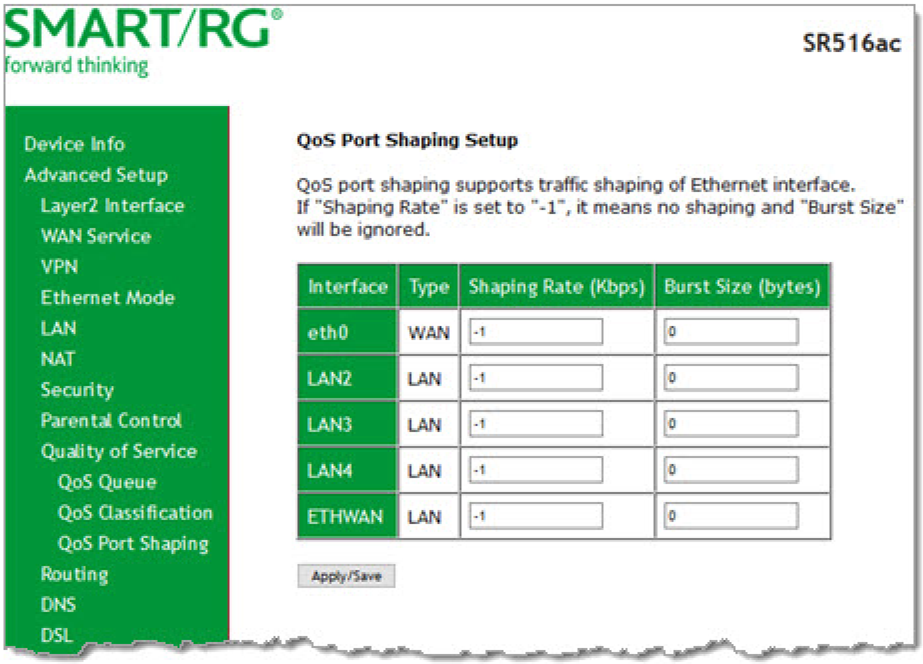
Field Name	Description
Add Network Traffic Class Rule section	
Traffic Class Name	Enter a descriptive name for this rule.
Rule Order	This option is set to **Last** and cannot be changed. Every rule is set as the very last classification rule to be processed.
Rule Status	Select whether this rule is active or inactive. Options are **Enable** and **Disable**. The default is **Enable**.
Specify Classification Criteria section	
All fields in this section are optional. A blank field identifies a criterion that is not used.	

Field Name	Description
Ingress Interface	Select an interface for incoming traffic. Options are **LAN**, **WAN**, **Local**, **2.4GHz**, **5GHz**, and any interface defined for your network. The default is **LAN**.
Ether Type	Select the Ethernet interface type for this classification. Options include **IP**, **ARP**, **IPV6**, **PPPoE**, and any other Ethernet interface defined for your network.
Source MAC Address / Mask	(*Available for LAN, ATM, ETH, PPP-Routed and wireless interfaces only*) Enter the source MAC address and source MAC mask for this classification.
Destination MAC Address / Mask	(*Available for LAN, ETH and wireless interfaces only*) Enter the destination MAC address and destination MAC mask for this classification.
Source IP Address [/ Mask] *or* Vendor Class ID *or* User Class ID	(*Available for WAN, ATM and PPP-Routed interfaces only*) Select the source for this classification. Options are: • **Source IP Address[/Mask]**: Enter the source IP address and source IP mask. • **Vendor Class ID (DHCP Option 60)**: Enter the vendor class ID. • **User Class ID (DHCP Option 77)**: Enter the user class ID.
Destination IP Address [/ Mask]	(*Available for WAN and ATM interfaces only*) Enter the destination IP address and source IP mask for this classification.
IP Length Check (Min/Max)	(*Available for WAN, Local, ATM interfaces only*) Enter the minimum and maximum number of digits required for IP addresses.
Protocol	(*Available for WAN, Local, and ATM interfaces only*)Select the protocol specified for this classification. Options are **TCP**, **UDP**, **ICMP**, and **IGMP**.
UDP/TCP Source Port	(*Appears when* **TCP** *or* ***UDP*** *is selected in the* **Protocol** *field*) Enter the source port to be used for this classification. You can enter a range (port:port) or a single port.
UDP/TCP Destination Port	(*Appears when* **TCP** *or* ***UDP*** *is selected in the* **Protocol** *field*) Enter the destination port to be used for this classification. You can enter a range (port:port) or a single port.
Specify Classification Results section	
Specify Egress Interface	Select an interface for outgoing traffic. Options include any interface defined for your network.
Specify Egress Queue	Select from the available queues. **Note:** Make sure to select a queue that is defined for the interface that you selected. If you select a queue that is not defined for the selected interface, any packets classified into that queue are processed by the default queue for the interface.
Mark 802.1p priority	(*Available for LAN, bridged and wireless interfaces only*) This value is inserted into the Ethernet frame and used to differentiate traffic. Lower values assign higher priorities. Options are **0** - **7**.
Set Rate Limit (Kbps)	Enter the data traffic rate limit for this classification in kilobits per second.

QoS Port Shaping

On this page, you can configure a fixed rate (Kbps) for each of the Ethernet ports.

1. In the left navigation bar, click **Advanced Setup** > **Quality Of Service** > **QoS Port Shaping**. The following page appears.



QoS Port Shaping Setup

QoS port shaping supports traffic shaping of Ethernet interface.
If "Shaping Rate" is set to "-1", it means no shaping and "Burst Size" will be ignored.

Interface	Type	Shaping Rate (Kbps)	Burst Size (bytes)
eth0	WAN	-1	0
LAN2	LAN	-1	0
LAN3	LAN	-1	0
LAN4	LAN	-1	0
ETHWAN	LAN	-1	0

2. (*Optional*) For each interface in the table, enter a **Shaping Rate** (in Kbps) and a **Burst Size** (in bytes). The default settings work for most scenarios.
3. Click **Apply/Save** to commit your changes.

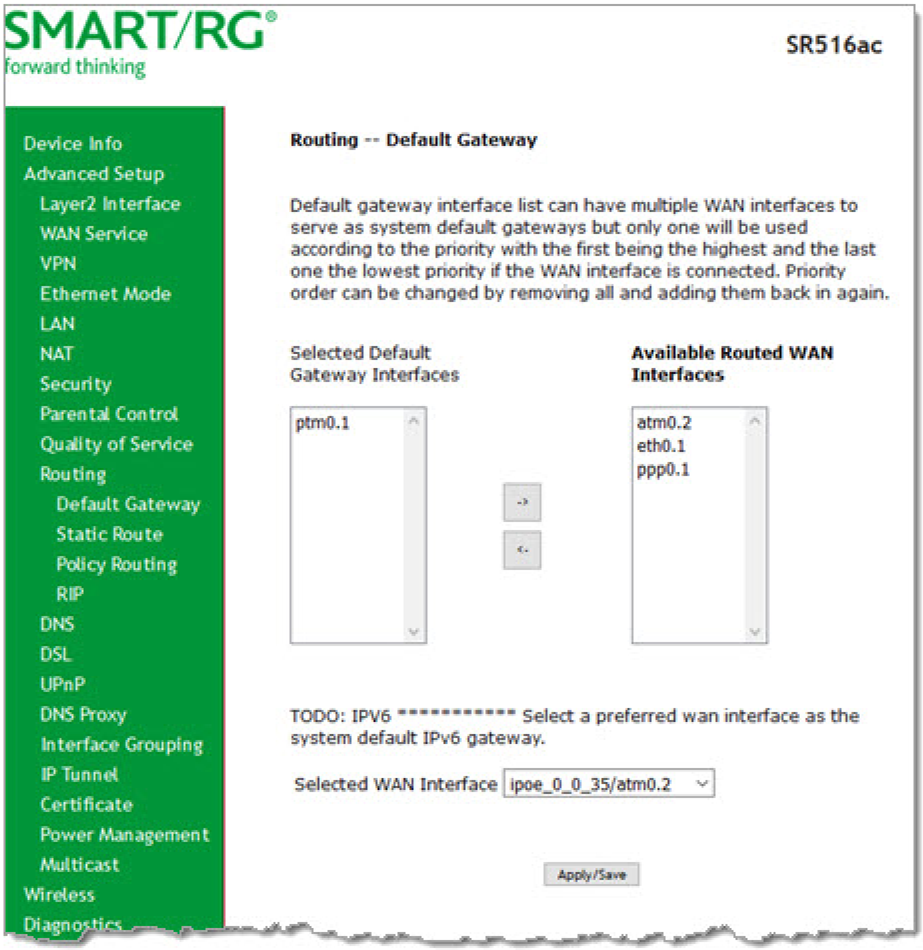
Routing

In this section, you can configure default gateway, static routing, policy routing and RIP settings.

Default Gateway

On this page, you can select the WAN interface for the default gateway.

1. In the left navigation bar, click Advanced Setup > Routing. The following page appears.



Routing -- Default Gateway

Default gateway interface list can have multiple WAN interfaces to serve as system default gateways but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

Selected Default Gateway Interfaces	Available Routed WAN Interfaces
ptm0.1	atm0.2 eth0.1 ppp0.1

TODO: IPV6 *********** Select a preferred wan interface as the system default IPv6 gateway.

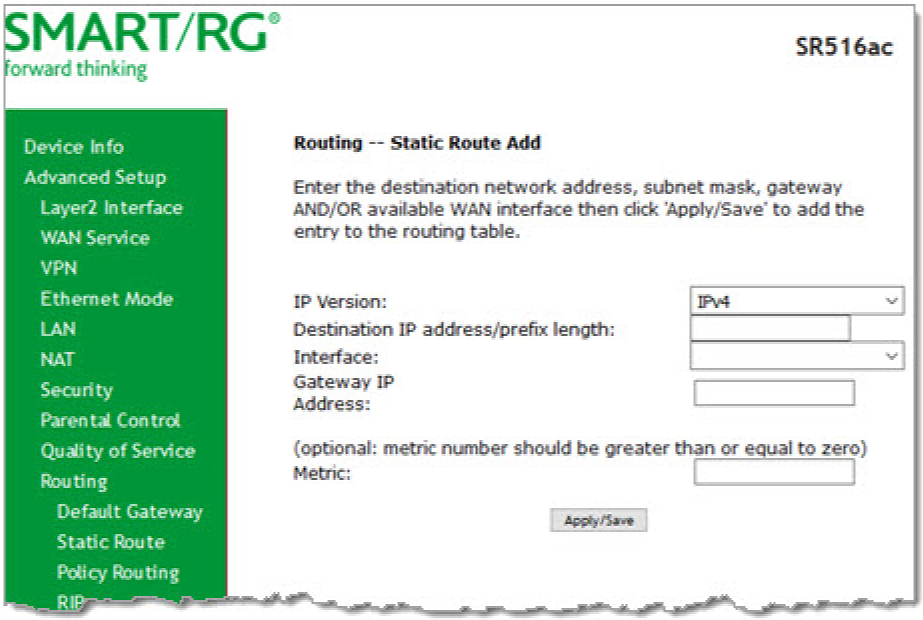
Selected WAN Interface: ipoe_0_0_35/atm0.2

2. (*Optional*) Select entries in the lists and click the arrows to move your selections from left to right or right to left.
3. (*Optional*) In the Selected WAN Interface field, select the appropriate interface.
4. Click Apply/Save to implement the settings.

Static Route

On this page, you can configure static routes for your network. Static route is a form of manually configured, fixed route for IP data. You can enter a maximum of 32 entries.

1. In the left navigation bar, click Advanced Setup > Routing > Static Route and then click Add. The following page appears.



Routing -- Static Route Add

Enter the destination network address, subnet mask, gateway AND/OR available WAN interface then click 'Apply/Save' to add the entry to the routing table.

IP Version: IPv4
Destination IP address/prefix length:
Interface:
Gateway IP Address:

(optional: metric number should be greater than or equal to zero)
Metric:

2. Fill in the fields, using the information in the table below.
3. Click Apply/Save to commit your changes.

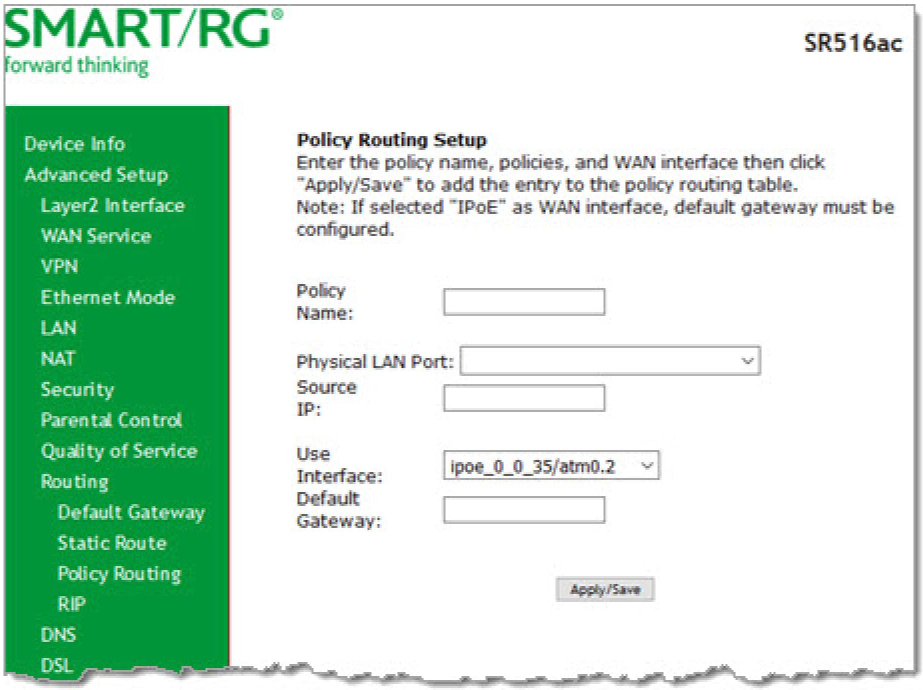
The fields on this page are defined below.

Field Name	Description
IP Version	Select the IP version associated with the static route you wish to create. Options are **IPv4** and **IPv6**.
Destination IP address/-prefix length	Enter the destination network address / subnet mask for this route.
Interface	Select the WAN Interface for this route. This list is filtered by the selected IP version.
Gateway IP Address	Enter the next-hop IP address. If needed, include the /prefix length.
Metric	(*Optional*) Enter a number that is zero or higher.

Policy Routing

Policy routing makes somewhat automated routing choices based on policies defined by a network administrator. For example, a network administrator might want to deviate from standard routing based on destination markers in the packet and, instead, forward a packet based on the source address. Use this feature to establish similar policies.

1. In the left navigation bar, click Advanced Setup > Routing > Policy Routing and then click Add. The following page appears.



Policy Routing Setup

Enter the policy name, policies, and WAN interface then click "Apply/Save" to add the entry to the policy routing table.

Note: If selected "IPoE" as WAN interface, default gateway must be configured.

Policy Name:

Physical LAN Port:

Source IP:

Use Interface: ipoe_0_0_35/atm0.2

Default Gateway:

2. Fill in the fields, using the information in the table below.
3. Click **Apply/Save** to commit your changes. You are returned to the Policy Routing Setting page.
4. To remove a route, click the **Remove** check box next to it and then click the **Remove** button. The list is refreshed.

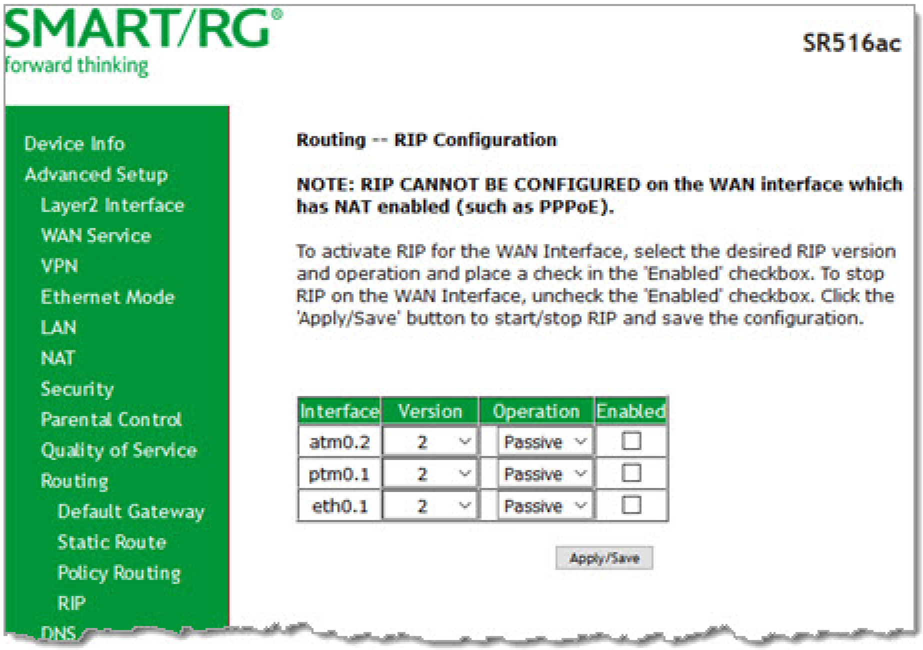
The fields on this page are defined below.

Field Name	Description
Policy Name	Enter a descriptive name for this entry to the policy routing table. The maximum is 8 characters. Special characters are not allowed.
Physical LAN Port	Select a physical LAN interface for the policy route. Options include Ethernet (LAN) ports 1-4 and both wireless bands.
Source IP	Enter the IP address for the source of the policy route.
Use Interface	Select the WAN Interface for this policy route. If you select an IPoE interface, you must enter the IP address for the **Default Gateway**.

RIP

RIP (Routing Information Protocol) is a type of distance-vector routing protocol, which leverages hop count as a metric for routing. RIP puts a limit on the number of hops (maximum of 15) allowed in order to prevent routing loops. This can sometimes limit the size of networks where RIP can be successfully employed.

1. In the left navigation bar, click **Advanced Setup** > **Routing** > **RIP**. The following page appears.



Routing -- RIP Configuration

NOTE: RIP CANNOT BE CONFIGURED on the WAN interface which has NAT enabled (such as PPPoE).

To activate RIP for the WAN Interface, select the desired RIP version and operation and place a check in the 'Enabled' checkbox. To stop RIP on the WAN Interface, uncheck the 'Enabled' checkbox. Click the 'Apply/Save' button to start/stop RIP and save the configuration.

Interface	Version	Operation	Enabled
atm0.2	2	Passive	☐
ptm0.1	2	Passive	☐
eth0.1	2	Passive	☐

2. For the interface that you want to modify, select values using the information in the table below.
3. To enable a configuration, click the **Enabled** checkbox next to the interface.
4. Click **Apply/Save** to commit your changes.

The fields on this page are defined below.

Field Name	Description
Interface	Displays a list of available WAN interfaces.
Version	Select the applicable version of the Routing Interface Protocol. For detailed information about versions, refer to RFC 1058 and RFC 1453. Options are **1**, **2**, and **Both**.
Operation	This option is set to **Passive** and cannot be changed. This mode listens only. It does not advertise routes.

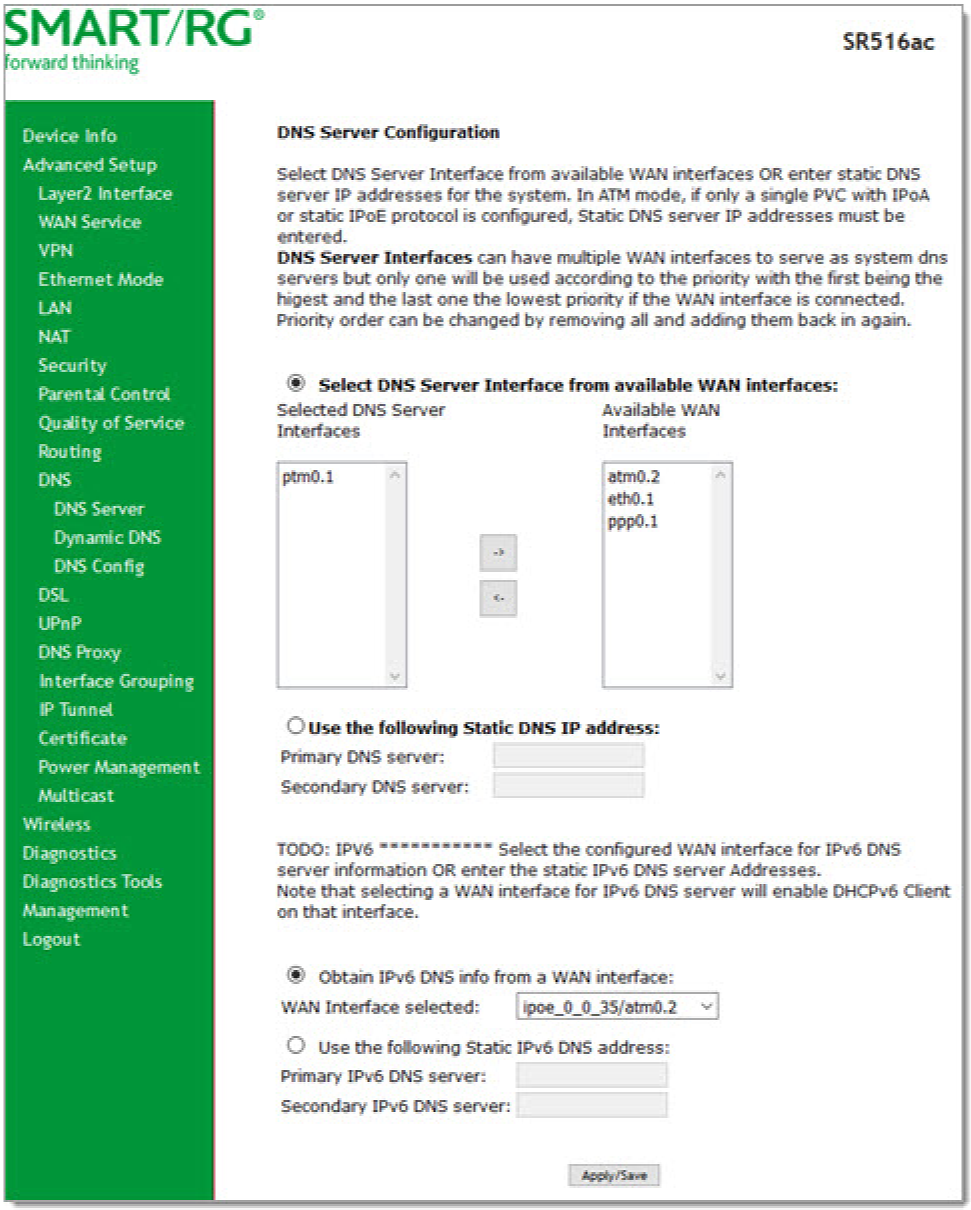
DNS

In this section, you can configure a DNS server, dynamic DNS and static DNS.

DNS Server

On this page, you can select a DNS server interface from the available interfaces, manually enter the DNS server addresses, or obtain the DNS address from a WAN interface.

1. In the left navigation bar, click Advanced Setup > DNS. The following page appears.



DNS Server Configuration

Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered.
DNS Server Interfaces can have multiple WAN interfaces to serve as system dns servers but only one will be used according to the priority with the first being the higest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

● **Select DNS Server Interface from available WAN interfaces:**

Selected DNS Server Interfaces	Available WAN Interfaces
ptm0.1	atm0.2 eth0.1 ppp0.1

○ **Use the following Static DNS IP address:**

Primary DNS server:

Secondary DNS server:

TODO: IPV6 *********** Select the configured WAN interface for IPv6 DNS server information OR enter the static IPv6 DNS server Addresses.
Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.

● Obtain IPv6 DNS info from a WAN interface:

WAN Interface selected: ipoe_0_0_35/atm0.2

○ Use the following Static IPv6 DNS address:

Primary IPv6 DNS server:

Secondary IPv6 DNS server:

2. Do one of the following to configure the DNS server:
   - **Select the DNS server interface from available WAN interfaces:** Select interface entries in the lists and click the arrows to move the entries right or left.
   - **Define a static DNS IP address:** Click Use the following Static DNS IP address and enter the DNS server IP addresses.

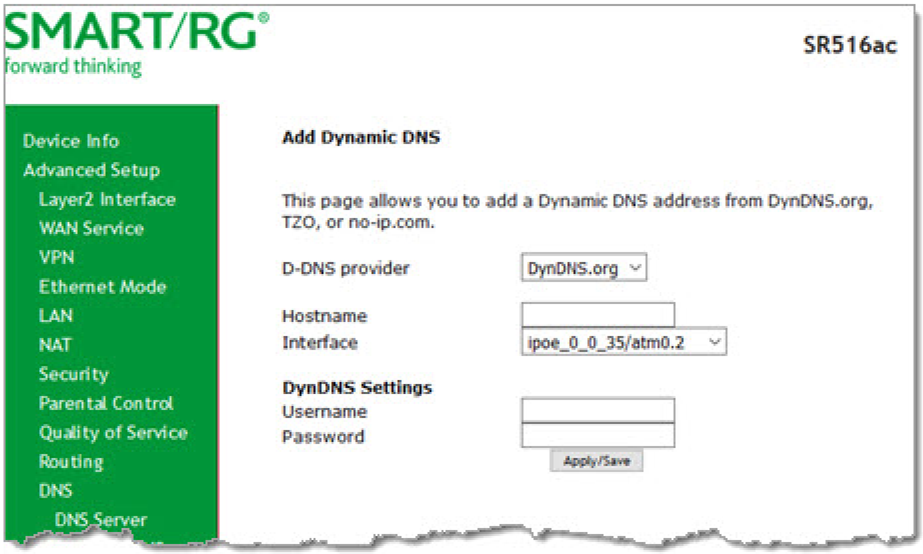
- **Obtain IPv6 DNS information from a WAN interface:** Select the interface in the WAN Interface Selected field. If no WAN interface is configured for your gateway, this field is disabled.
- **Define a static IPv6 DNS IP address:** Click Use the following Static IPv6 DNS address and enter the DNS server IP addresses.

3. Click Apply/Save to apply your settings.

Dynamic DNS

Dynamic DNS (DDNS) automatically updates a name server in the DNS with the active DNS configuration of its configured host-names, addresses or other data. Often this update occurs in real time. You can configure the settings for this feature on this page.

1. In the left navigation bar, click Advanced Setup > DNS > Dynamic DNS and then click Add. The following page appears.



Add Dynamic DNS

This page allows you to add a Dynamic DNS address from DynDNS.org, TZO, or no-ip.com.

D-DNS provider: DynDNS.org

Hostname:

Interface: ipoe_0_0_35/atm0.2

DynDNS Settings

Username:

Password:

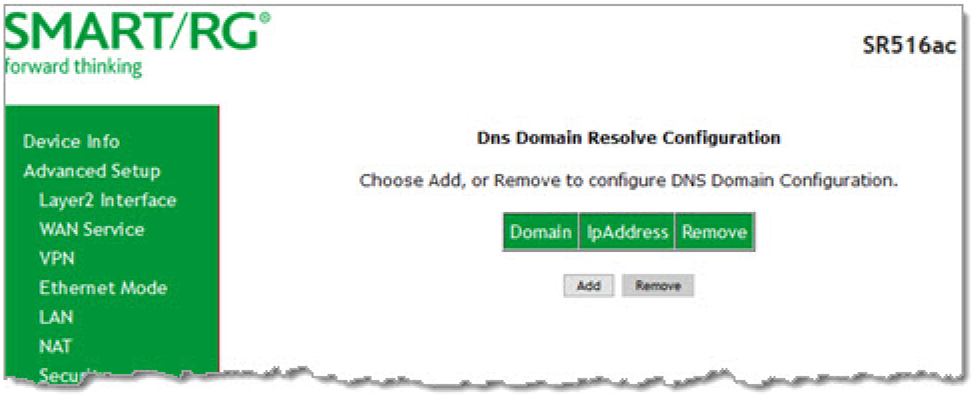
2. Modify the fields as needed, using the information in the table below.
3. Click Apply/Save to commit your changes.

Field Name	Description
D-DNS provider	Select a dynamic Domain Name Server provider. Options are **DynDNS.org**, **TZO** or **no-ip.com**. The default is **DynDNS.org**.
Hostname	Enter the host name of the dynamic DNS server.
Interface	Select the WAN interface whose traffic will be pointed at the specified Dynamic DNS provider.
DynDNS Settings section	
Username	Enter the username for the dynamic DNS server.
Password	Enter the password for the dynamic DNS server.

DNS Config

On this page, you can configure DNS domains.

1. In the left navigation bar, click **Advanced Setup** > **DNS** > **DNS Config**. The following page appears.

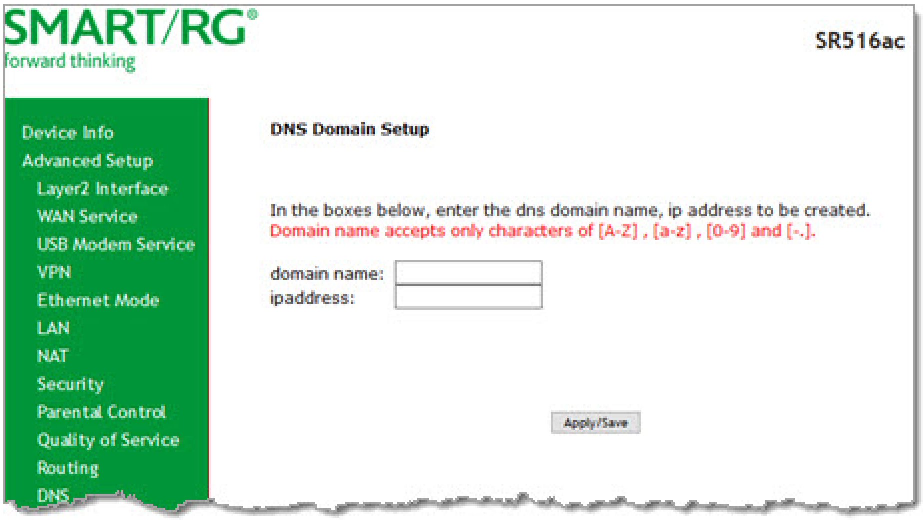


Dns Domain Resolve Configuration

Choose Add, or Remove to configure DNS Domain Configuration.

Domain	IpAddress	Remove

2. To add a DNS domain, click **Add**. The following page appears.



DNS Domain Setup

In the boxes below, enter the dns domain name, ip address to be created.
Domain name accepts only characters of [A-Z] , [a-z] , [0-9] and [-.].

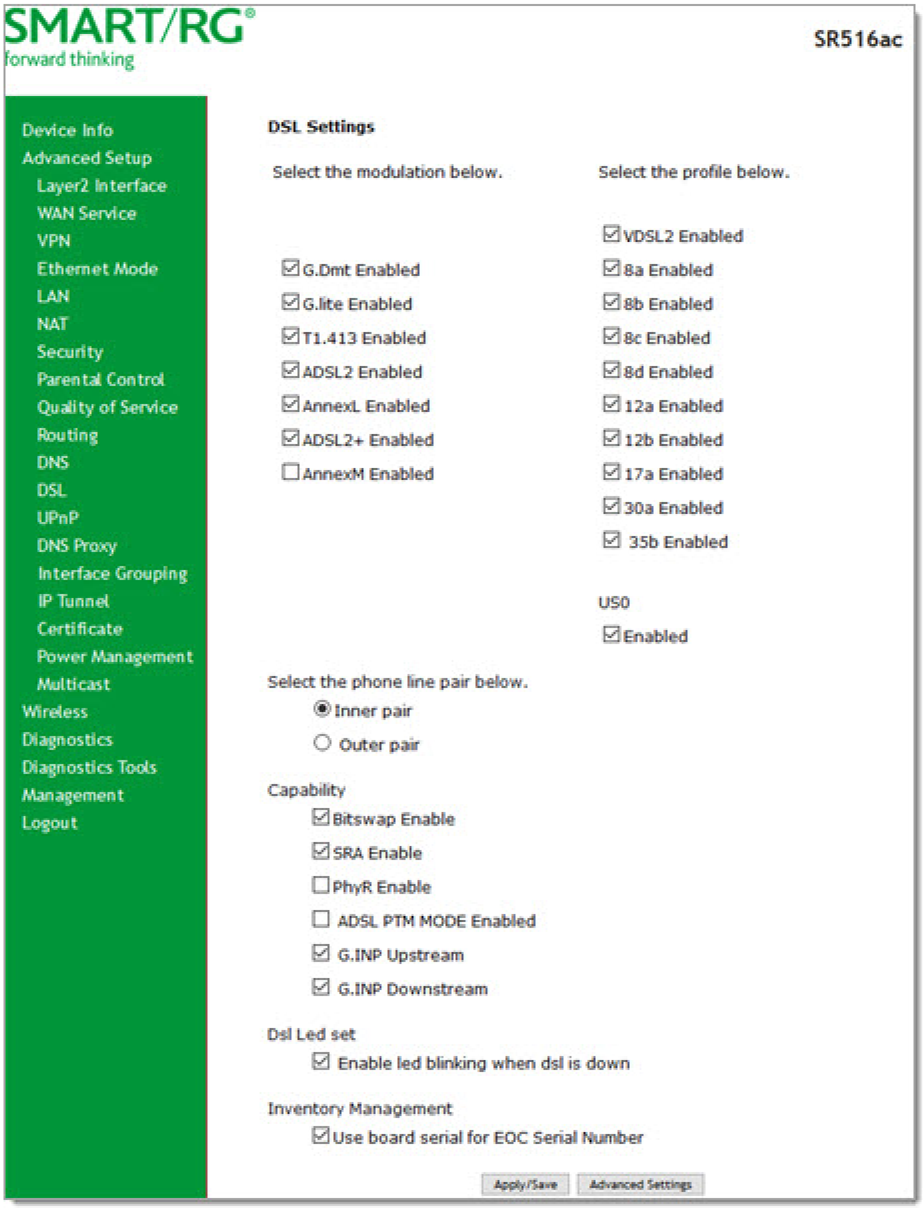
domain name:
ipaddress:

3. Enter a domain name and IP address for the domain. Only letters, numbers, dashes, and periods are allowed.
4. Click **Apply/Save** to apply your settings.

DSL

On this page, you can set the DSL settings. The modem negotiates the modulation mode with the DSLAM; you usually do not need to modify the factory default settings.

1. In the left navigation menu, select **Advanced Setup** > **DSL**. The following page appears.



DSL Settings

Select the modulation below.

☑ G.Dmt Enabled
☑ G.lite Enabled
☑ T1.413 Enabled
☑ ADSL2 Enabled
☑ AnnexL Enabled
☑ ADSL2+ Enabled
□ AnnexM Enabled

Select the profile below.

☑ VDSL2 Enabled
☑ 8a Enabled
☑ 8b Enabled
☑ 8c Enabled
☑ 8d Enabled
☑ 12a Enabled
☑ 12b Enabled
☑ 17a Enabled
☑ 30a Enabled
☑ 35b Enabled

US0

☑ Enabled

Select the phone line pair below.

● Inner pair
○ Outer pair

Capability

☑ Bitswap Enable
☑ SRA Enable
□ PhyR Enable
□ ADSL PTM MODE Enabled
☑ G.INP Upstream
☑ G.INP Downstream

Dsl Led set

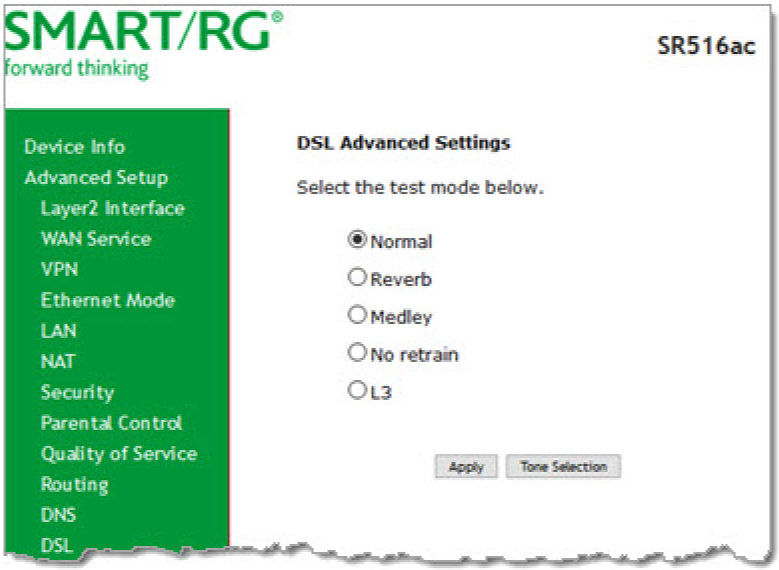
☑ Enable led blinking when dsl is down

Inventory Management

☑ Use board serial for EOC Serial Number

2. Modify the settings as needed.

3. (*Optional*) To modify additional parameters, click **Advanced Settings**. The following page appears.



DSL Advanced Settings

Select the test mode below.

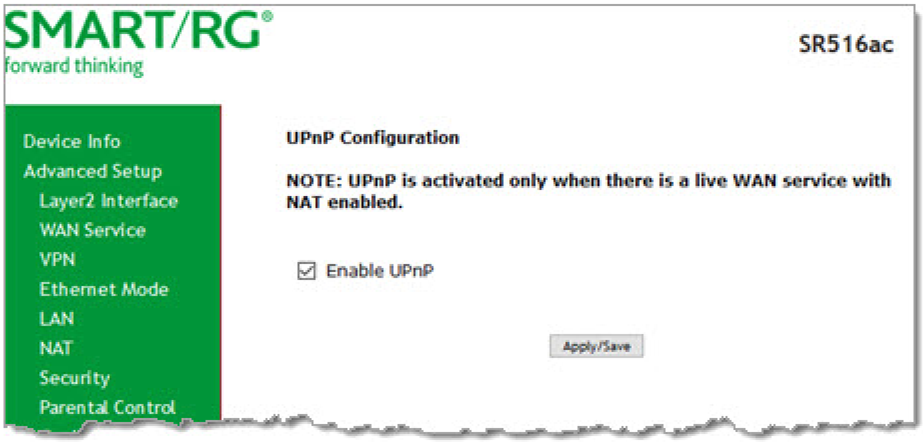
● Normal
○ Reverb
○ Medley
○ No retrain
○ L3

4. Select the test mode that you want to run.
5. To view the tone selection table, click **Tone Selection**. Changing these settings arbitrarily is *not* recommended. Close the window to return to the DSL Advanced Settings page.
6. Click **Apply** and then click **DSL** in the left menu to return to the DSL page.
7. Click **Apply/Save** to save your changes.

UPnP

On this page, you can enable or disable the UPnP function.

1. In the left navigation menu, click **Advanced Setup** > **UPnP**. The following page appears.



UPnP Configuration

NOTE: UPnP is activated only when there is a live WAN service with NAT enabled.

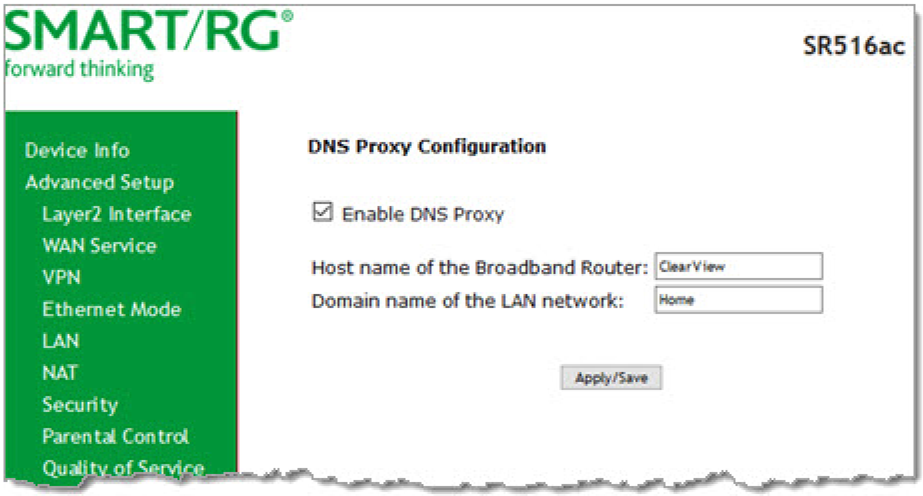
☑ Enable UPnP

2. To *disable* UPnP, click the **Enable UPnP** check box to clear it.
3. Click **Apply/Save** to save and apply the settings.

DNS Proxy

On this page, you can enable or disable the DNS proxy function. This function is enabled by default.

1. In the left navigation menu, click **Advanced Setup** > **DNS Proxy**. The following page appears.



DNS Proxy Configuration

☑ Enable DNS Proxy

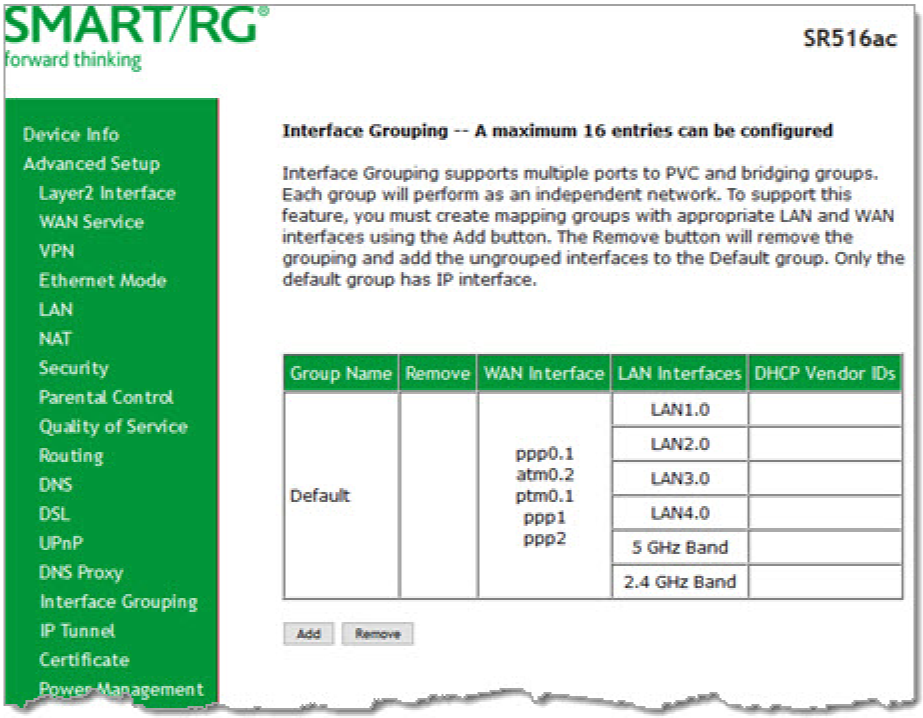
Host name of the Broadband Router: ClearView
Domain name of the LAN network: Home

2. To *disable* the DNS Proxy, click the **Enable DNS Proxy** checkbox to clear it.
3. To modify the host and domain, enter the host name of the new broadband gateway and the domain name of the LAN network.
4. Click **Apply/Save** to implement the settings.

Interface Grouping

On this page, you can configure interface groupings. Interface grouping supports multiple ports to PVC and bridging groups. Each group performs as an independent network. Only the default group has an IP interface. To support this feature, you must create mapping groups with the appropriate LAN and WAN interfaces.

1. In the left navigation menu, click **Advanced Setup** > **Interface Grouping**. The following page appears.

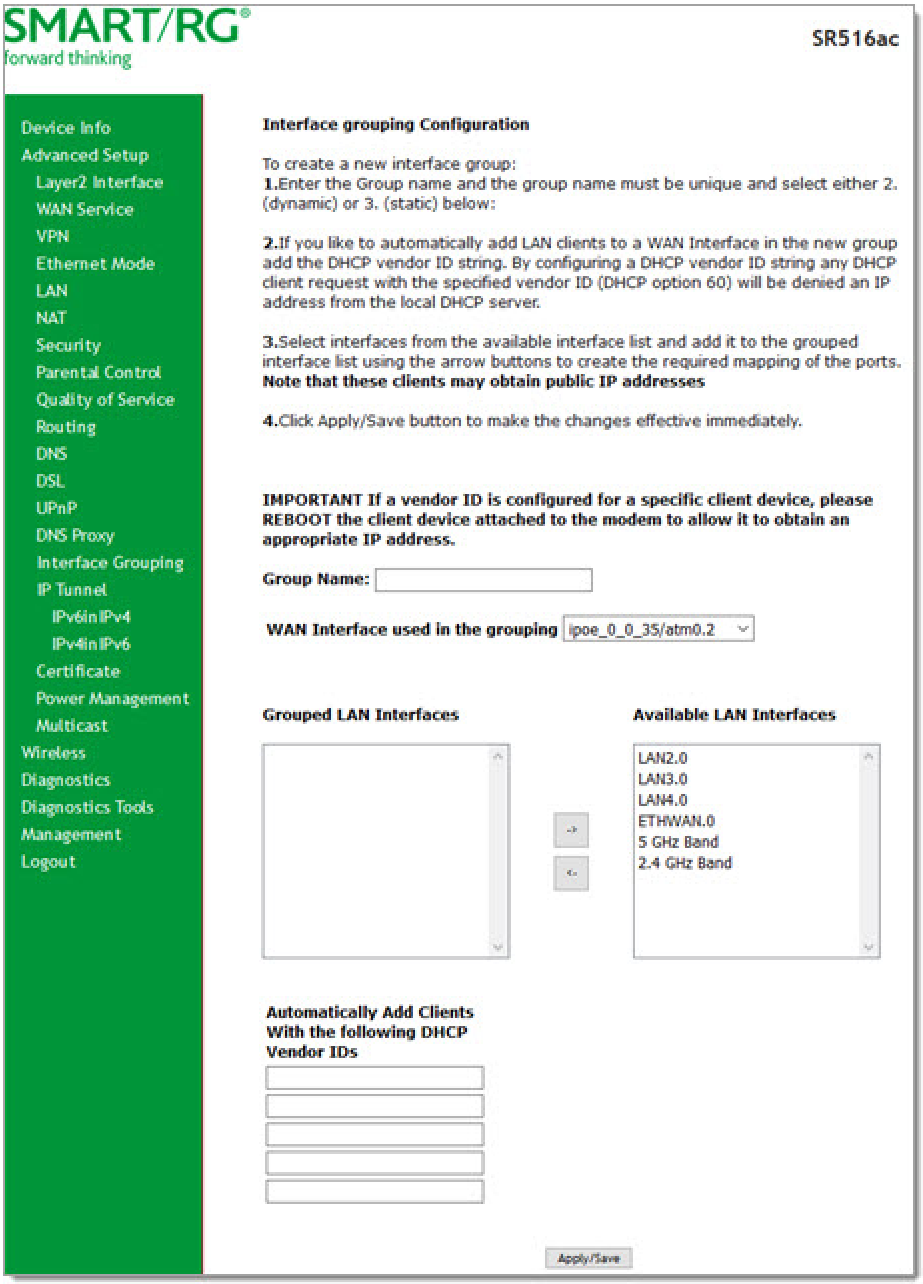


Interface Grouping -- A maximum 16 entries can be configured

Interface Grouping supports multiple ports to PVC and bridging groups. Each group will perform as an independent network. To support this feature, you must create mapping groups with appropriate LAN and WAN interfaces using the Add button. The Remove button will remove the grouping and add the ungrouped interfaces to the Default group. Only the default group has IP interface.

Group Name	Remove	WAN Interface	LAN Interfaces	DHCP Vendor IDs
Default		ppp0.1 atm0.2 ptm0.1 ppp1 ppp2	LAN1.0	
			LAN2.0	
			LAN3.0	
			LAN4.0	
			5 GHz Band	
			2.4 GHz Band	

2. To add a new grouping, click **Add**. The following page appears.



Interface grouping Configuration

To create a new interface group:
1.Enter the Group name and the group name must be unique and select either 2. (dynamic) or 3. (static) below:

2.If you like to automatically add LAN clients to a WAN Interface in the new group add the DHCP vendor ID string. By configuring a DHCP vendor ID string any DHCP client request with the specified vendor ID (DHCP option 60) will be denied an IP address from the local DHCP server.

3.Select interfaces from the available interface list and add it to the grouped interface list using the arrow buttons to create the required mapping of the ports. **Note that these clients may obtain public IP addresses**

4.Click Apply/Save button to make the changes effective immediately.

IMPORTANT If a vendor ID is configured for a specific client device, please REBOOT the client device attached to the modem to allow it to obtain an appropriate IP address.

Group Name:

WAN Interface used in the grouping ipoe_0_0_35/atm0.2

Grouped LAN Interfaces

Available LAN Interfaces

LAN2.0
LAN3.0
LAN4.0
ETHWAN.0
5 GHz Band
2.4 GHz Band

Automatically Add Clients With the following DHCP Vendor IDs

3. Follow the on-screen instructions and then click **Apply/Save**.
4. To remove a grouping from the list, click the **Remove** checkbox next to the group name and then click the **Remove** button. You can only remove groupings that you create.

IP Tunnel

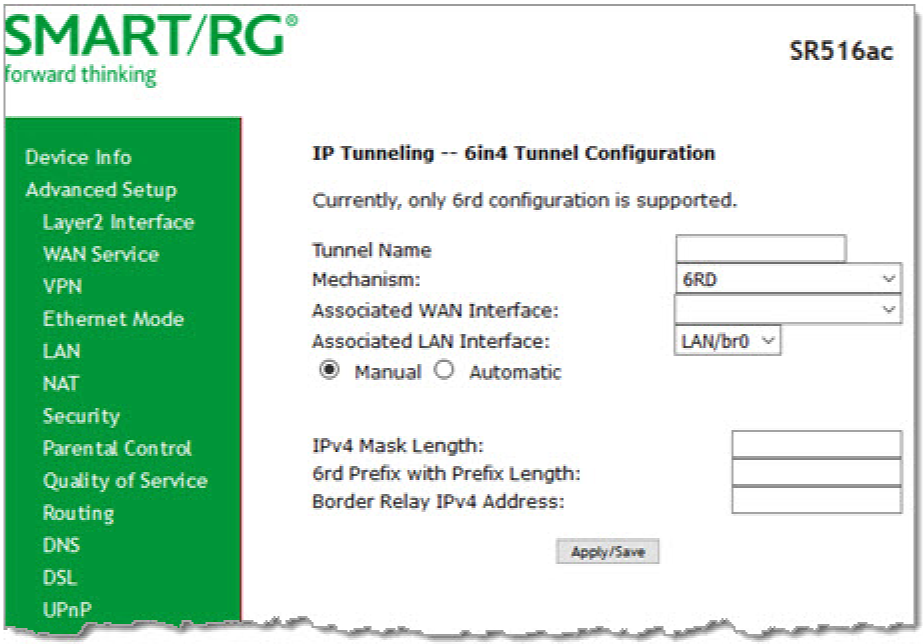
IP Tunneling is typically used as a means to establish a path between two independent networks.

In this section, you can configure connections of IPv6 networks across the IPv4 internet or IPv4 in IPv6.

IPv6inIPv4

On this page, you can configure a tunnel for IPv6inIPv4.

1. In the left navigation bar, click Advanced Setup > IP Tunnel and then click Add. The following page appears.



IP Tunneling -- 6in4 Tunnel Configuration

Currently, only 6rd configuration is supported.

Tunnel Name:
Mechanism: 6RD
Associated WAN Interface:
Associated LAN Interface: LAN/br0
● Manual ○ Automatic

IPv4 Mask Length:
6rd Prefix with Prefix Length:
Border Relay IPv4 Address:

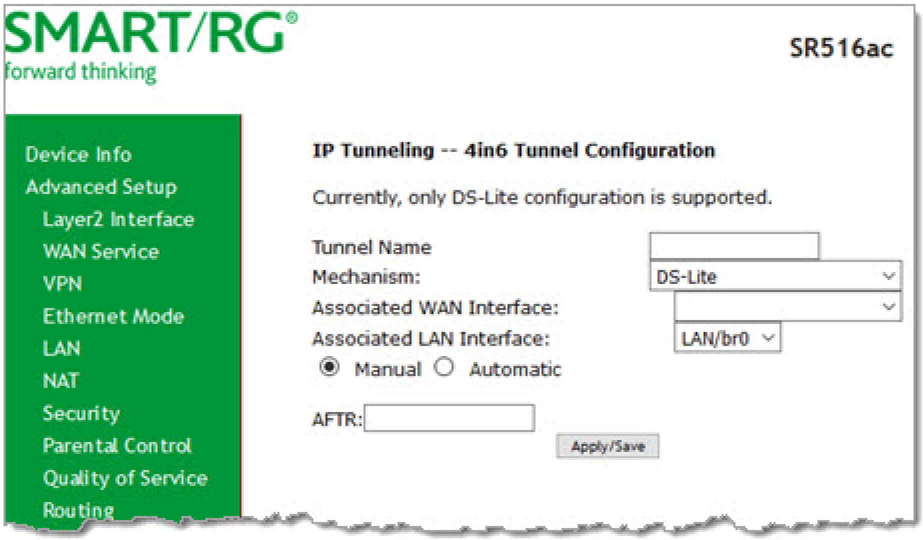
2. Enter a Tunnel Name. In the Mechanism field, the only option is **6RD**.
3. Select the WAN and LAN interfaces associated with the tunnel you wish to establish.
4. Do one of the following:
   - To configure the LAN interface settings manually, enter values in the fields located below the Manual button:
     - IPv4 Mask Length: Options are **0** - **32**.
     - 6rd Prefix with Prefix Length: Prefix/length, such as: 2002::/64.
     - Border Relay IPv4 Address: IP address for the IPv4 relay server.

   To configure these settings automatically, click Automatic.
5. Click Apply/Save to commit your changes.

IPv4inIPv6

On this page, you can configure a tunnel for IPv4inIPv6.

1. In the left navigation bar, click Advanced Setup > IP Tunnel > IPv4inIPv6 and then click Add. The following page appears.



IP Tunneling -- 4in6 Tunnel Configuration

Currently, only DS-Lite configuration is supported.

Tunnel Name
Mechanism: DS-Lite
Associated WAN Interface:
Associated LAN Interface: LAN/br0
● Manual ○ Automatic

AFTR:

2. Enter a Tunnel Name. In the Mechanism field, the only option is **DS-Lite**.
3. Select the LAN and WAN interfaces associated with the tunnel you wish to establish.
4. In the AFTR (Address Family Transition Router) field, do either of the following:
   - To configure manually, enter the remote address in the AFTR field.
   - To configure automatically, select Automatic above the AFTR field.
5. Click Apply/Save to commit your changes.

Certificate

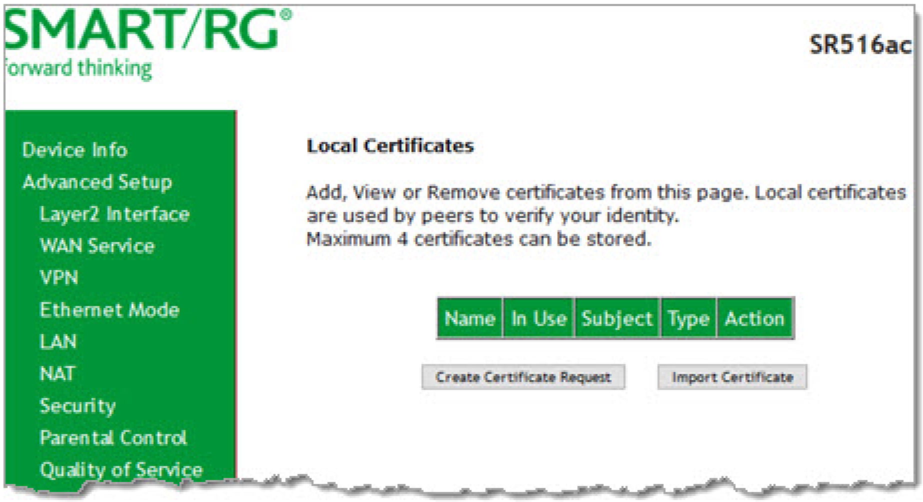
In this section, you can configure certificates (local and Trusted CA) for the gateway. For more information about certificates, refer to the ITU X.509 standard.

Local

On this page, you can manage local certificates used to identify the gateway to other users. You can create a new certificate request locally and have it signed by a certificate authority, or you can import an existing certificate. For additional info regarding Public Key Infrastructure (PKI), refer to ITU-T X.509.

Creating certificate requests

1. In the left navigation bar, click **Advanced Setup** > **Certificate**. The following page appears.

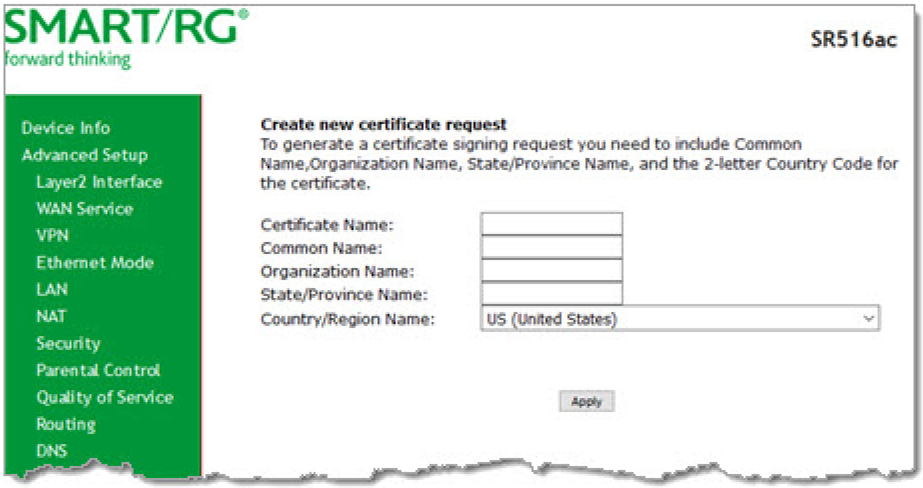


Local Certificates

Add, View or Remove certificates from this page. Local certificates are used by peers to verify your identity.
Maximum 4 certificates can be stored.

Name	In Use	Subject	Type	Action

2. Click **Create Certificate Request**. The following page appears.



Create new certificate request
To generate a certificate signing request you need to include Common Name,Organization Name, State/Province Name, and the 2-letter Country Code for the certificate.

Certificate Name:
Common Name:
Organization Name:
State/Province Name:
Country/Region Name: US (United States)

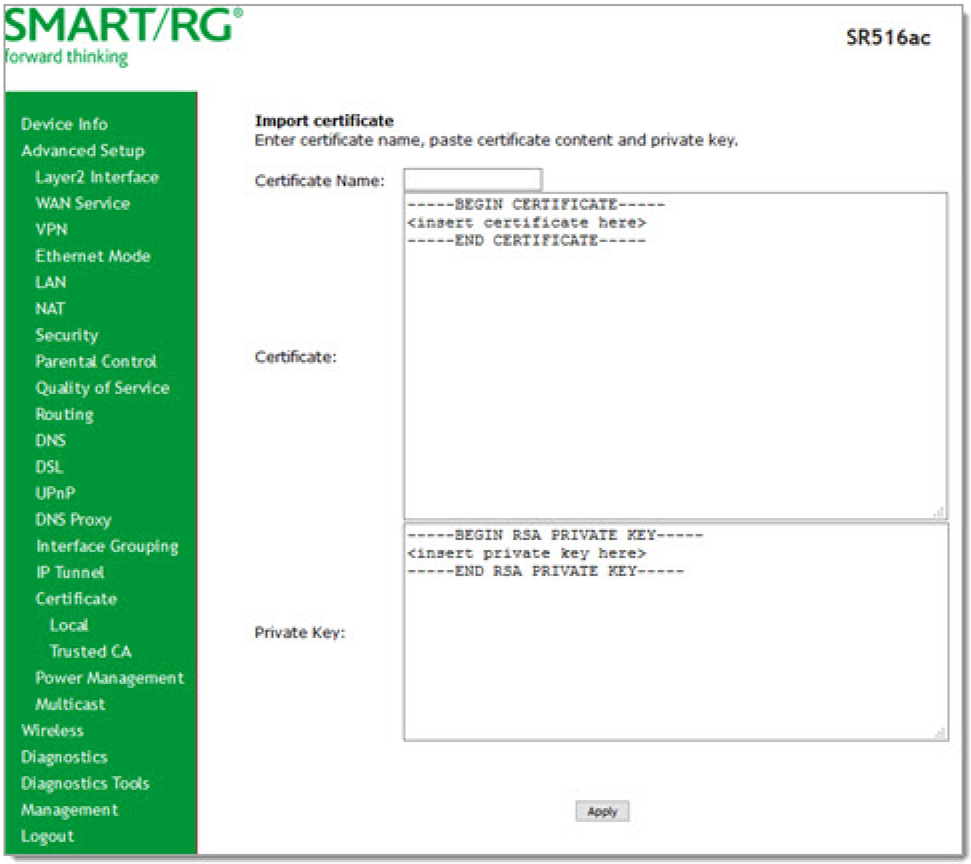
3. Enter your connection details, using the information provided in the table below.
4. Click **Apply** to complete the request.
5. Submit your certificate request to a certificate authority for signature.

Field Name	Description
Certificate Name	Enter a certificate name that describes the intended use of the certificate.
Common Name	Enter the IP address (in dotted decimal notation), domain name, or email address. Browsers use this information to verify your certificate is valid.
Organization Name	Enter the name or the company or organization creating the request.

Field Name	Description
State/Province Name	Enter the full name of the state or province where your organization's head office is located.
Country/Region	Select the country or region in which this certificate will be employed.

Importing a local certificate and private key

1. In the left navigation bar, click **Advanced Setup** > **Certificate** > **Local**. Then click **Import Certificate**. The following page appears.



Import certificate

Enter certificate name, paste certificate content and private key.

Certificate Name:

Certificate:

```
-----BEGIN CERTIFICATE-----
<insert certificate here>
-----END CERTIFICATE-----
```

Private Key:

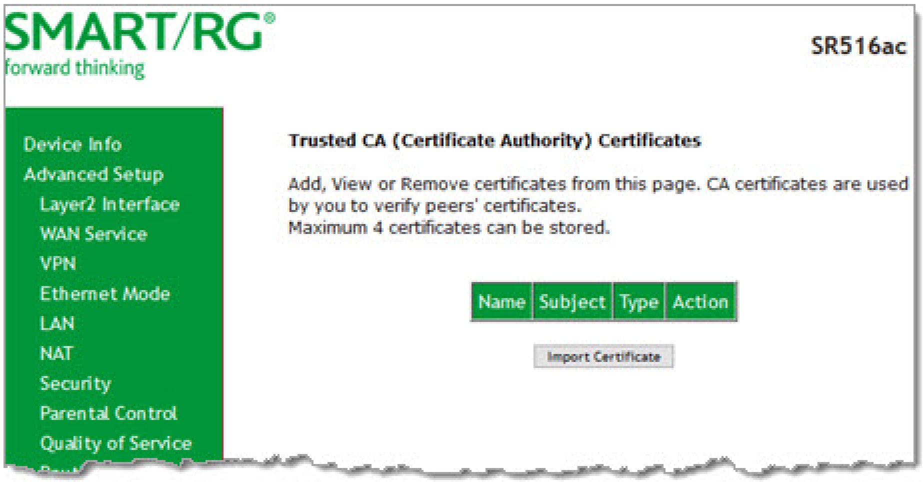
```
-----BEGIN RSA PRIVATE KEY-----
<insert private key here>
-----END RSA PRIVATE KEY-----
```

2. In the **Certificate Name** field, type "cpecert".
3. Paste the **Certificate** details between the **BEGIN** and **END** markers.
4. Paste the **Private Key** information between the **BEGIN** and **END** markers.
5. Click **Apply** to commit this certificate.

Trusted CA

On this page, you can import Trusted Certificates to identity other gateways to your gateway as a trusted source.

1. In the left navigation bar, click **Advanced Setup > Certificate > Trusted CA**. The following page appears.

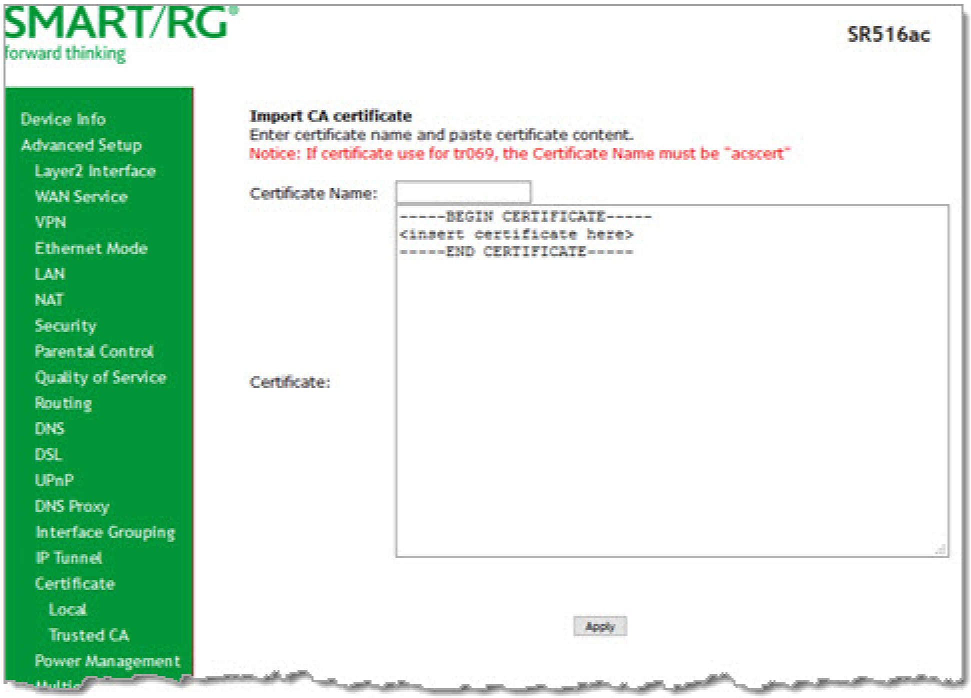


Trusted CA (Certificate Authority) Certificates

Add, View or Remove certificates from this page. CA certificates are used by you to verify peers' certificates.
Maximum 4 certificates can be stored.

Name	Subject	Type	Action

2. To import a certificate, click **Import Certificate**. The following page appears.



Import CA certificate
Enter certificate name and paste certificate content.
Notice: If certificate use for tr069, the Certificate Name must be "acscert"

Certificate Name:

Certificate:

```
-----BEGIN CERTIFICATE-----
<insert certificate here>
-----END CERTIFICATE-----
```

3. In the **Certificate Name** field, type a descriptive name for this certificate. If you are using this certificate with TR-069, the name must be "acscert".
4. Paste the certificate details between the **BEGIN** and **END** markers.
5. Click **Apply** to commit this certificate.

After you add one certificate, a **Remove** button appears on the **Trusted CA** landing page. Click this button to remove the current certificate and replace it with a new one.

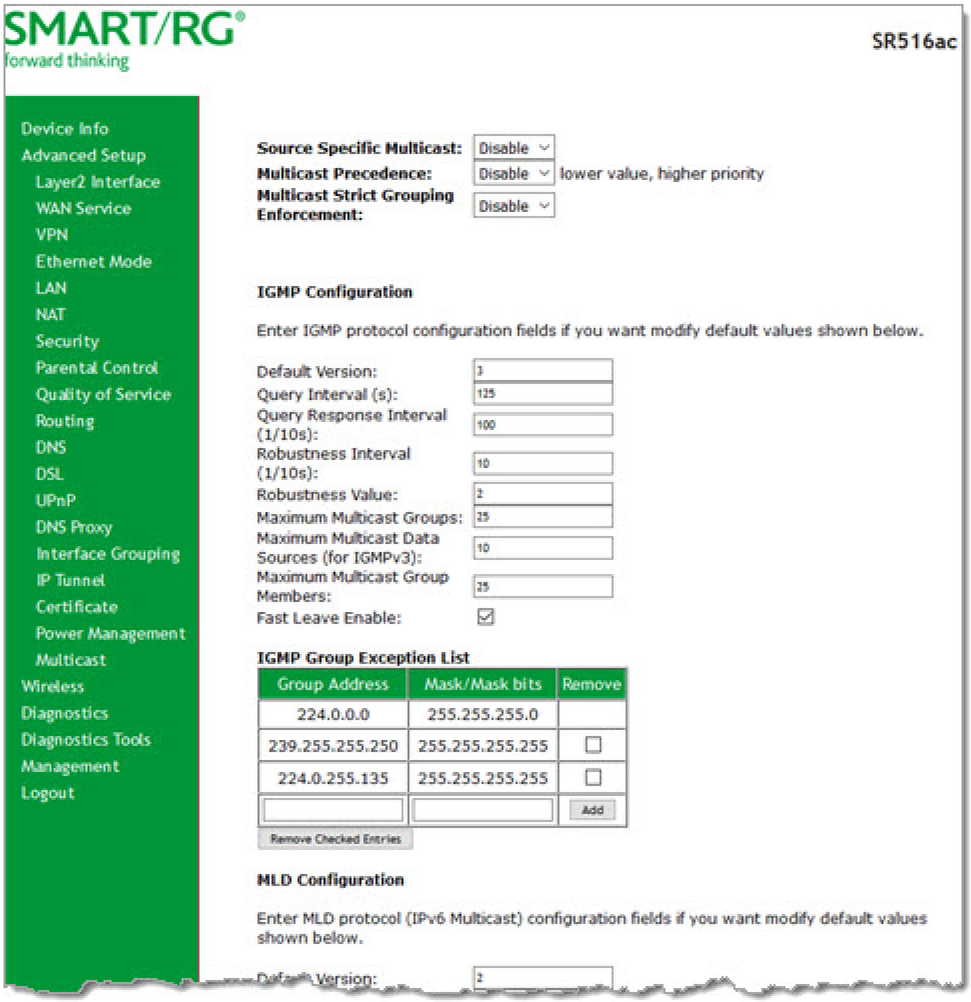
Power Management

Note: This feature is not currently supported.

Multicast

On this page, you can configure the multicast parameters.

1. In the left navigation menu, click **Advanced Setup** > **Multicast**. The following page appears.



Source Specific Multicast: Disable
Multicast Precedence: Disable lower value, higher priority
Multicast Strict Grouping Enforcement: Disable

IGMP Configuration

Enter IGMP protocol configuration fields if you want modify default values shown below.

Default Version: 3
Query Interval (s): 125
Query Response Interval (1/10s): 100
Robustness Interval (1/10s): 10
Robustness Value: 2
Maximum Multicast Groups: 25
Maximum Multicast Data Sources (for IGMPv3): 10
Maximum Multicast Group Members: 25
Fast Leave Enable: ☑

IGMP Group Exception List

Group Address	Mask/Mask bits	Remove
224.0.0.0	255.255.255.0	
239.255.255.250	255.255.255.255	□
224.0.255.135	255.255.255.255	□
		Add

MLD Configuration

Enter MLD protocol (IPv6 Multicast) configuration fields if you want modify default values shown below.

Default Version: 2

2. Fill in the fields, using the information in the table below. The fields provided for the IGMP and MLD configurations are largely the same.

3. To create or remove exceptions in the **Group Exception List** table, follow the instructions in Managing group exception lists.
4. Click **Apply/Save** to save and apply the settings.

Field Name	Description
Source Specific Multicast	Select whether a specific multicast source is used. Options are **Disable** and **Enable**. The default is **Disable**.
Multicast Precedence	Select whether IGMP packets are given priority handling and at what level. Options are: - **Enable:** IGMP packets are prioritized using the multicast precedence value. The lower the multicast precedence value, the higher that IGMP packets will be placed in the queue. - **Disable:** IGMP packets are not prioritized. This is the default.
Multicast Strict Grouping Enforcement	Select whether to enforce strict key management rules. Options are **Enable** and **Disable**. The default is **Disable**.
IGMP Configuration and **MLD Configuration** sections	
Default Version	Enter the supported IGMP version. Options are **1** - **3**.
Query Interval	Enter the interval at which the multicast router sends a query messages to hosts, expressed in seconds. If you enter a number below **128**, the value is used directly. If you enter a number above **128**, it is interpreted as an exponent and mantissa.
Query Response Interval	Upon receiving a query packet, a host begins counting down seconds, from a random number. When the timer expires, the host sends its report. Enter the maximum number of seconds that a host can pick to count down from.
Robustness Interval	(*Applies to IGMP configuration only*) Enter the maximum response time within which the host must respond to the Out of Sequence query from the router. The default is **10** seconds.
Last Member Query Interval	(*Applies to MLD configuration only*) Enter the maximum response time within which the host must respond to the Out of Sequence query from the router. The default is **10s**. IGMP uses this value when the router receives an IGMPv2 Leave report indicating at least one host wants to leave the group. Upon receiving the Leave report, the router verifies whether the interface is configured for IGMP Immediate Leave. If not, the router sends the out-of-sequence query.
Robustness Value	Enter the value representing the complexity of the query. The greater the value, the more robust the query. Options are **2** - **7**.
Maximum Multicast Groups	Enter the maximum number of groups allowed. The default is **25** for IGMP and **10** for MLD.
Maximum Multicast Data Sources (for IGMPv3)	Enter the maximum number of data sources allowed. Options are **1** - **24**.
Maximum Multicast Group Members	Enter the maximum number of multicast groups that can be joined on a port or group of ports.

Field Name	Description
Fast Leave Enable	Select whether the IGMP proxy removes group members immediately without sending a query. Options are: • **Enabled:** Group members are removed immediately. This is the default. • **Disabled:** Group members are removed after a query is sent and a response received.

Managing group exception lists

You can manage exceptions for multicast groups using the **IGMP Group Exception List** or **MLD Group Exception List** tables. The first two entries are created by default; you cannot change these entries.

To add an exception, type the IP address in the **Group Address** field, enter the mask information in the **Mask / Mask bits** field, and then click **Add**.

To remove an exception, click the **Remove** check box next to it and then click the **Remove Checked Entries** button. The list refreshes.

Click **Apply / Save** to implement your changes.

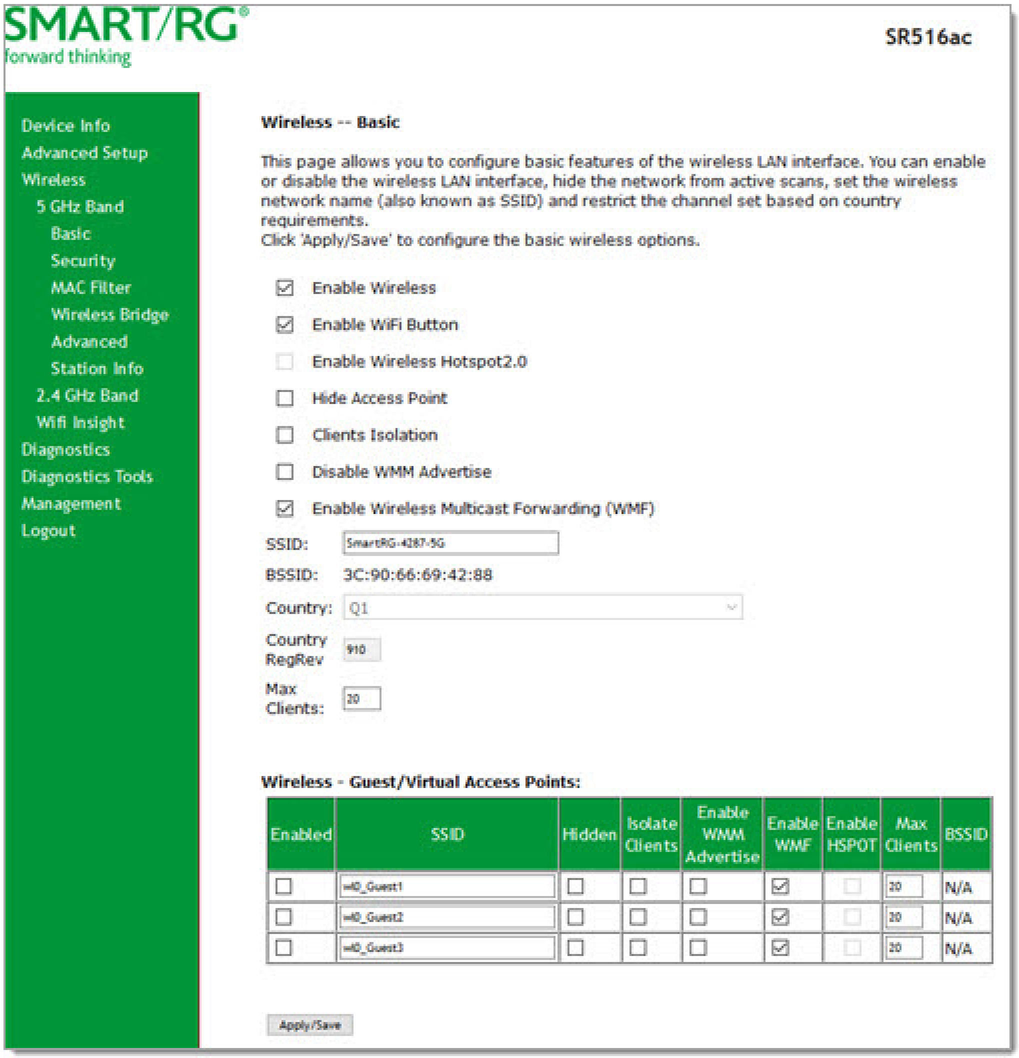
Wireless

In this section, you can configure the wireless interface settings for your gateway, including basic and advanced settings, MAC filtering, and wireless bridging.

Basic

On this page, you can configure basic features of the WiFi LAN interface. You can enable or disable the WiFi LAN interface, hide the network from active scans, set the WiFi network name (also known as SSID) and restrict the channel set based on country requirements.

1. In the left navigation bar, click **Wireless**. The following page appears, showing the information for the 5 GHz band.



Wireless -- Basic

This page allows you to configure basic features of the wireless LAN interface. You can enable or disable the wireless LAN interface, hide the network from active scans, set the wireless network name (also known as SSID) and restrict the channel set based on country requirements.
Click 'Apply/Save' to configure the basic wireless options.

☑ Enable Wireless

☑ Enable WiFi Button

□ Enable Wireless Hotspot2.0

□ Hide Access Point

□ Clients Isolation

□ Disable WMM Advertise

☑ Enable Wireless Multicast Forwarding (WMF)

SSID: SmartRG-4287-5G

BSSID: 3C:90:66:69:42:88

Country: Q1

Country RegRev: 910

Max Clients: 20

Wireless - Guest/Virtual Access Points:

Enabled	SSID	Hidden	Isolate Clients	Enable WMM Advertise	Enable WMF	Enable HSPOT	Max Clients	BSSID
□	wl0_Guest1	□	□	□	☑	□	20	N/A
□	wl0_Guest2	□	□	□	☑	□	20	N/A
□	wl0_Guest3	□	□	□	☑	□	20	N/A

2. If you want to view or configure the 2.4GHz band settings, click **2.4 GHZ Band** in the left menu.
3. Modify the settings as desired, using the information provided in the table below.
4. (*Optional*) Define up to three virtual access points for guest access using the information from the **Wireless - Guest/Virtual Access Points** section of the table below.
5. Click **Apply/Save** to commit your settings.

Field Name	Description
Enable Wireless	This option is selected by default. To *disable* the wireless feature, clear the checkbox. All other fields on the page are hidden.
Enable WiFi Button	This option is selected by default. To *disable* the gateway's 2.4GHz button, clear the checkbox.
Enable Wireless Hotspot 2.0	This option is disabled.
Hide Access Point	Click to hide the access point SSID from end users and passive scanning.
Clients Isolation	Click to prevent LAN client devices from communicating with one another on the wireless network.
Disable WMM Advertise	Click to stop the wireless from advertising Wireless Multimedia (WMM) functionality. Selecting this option can improve transmission performance for voice and video data.
Enable Wireless Multicast Forwarding	This option is selected by default allowing multicast traffic to be forwarded across wireless clients. This option can improve the quality of video services such as IPTV. To *disable* Wireless Multicast Forwarding (WMF), clear the checkbox.
SSID	(*Optional*) Enter the WiFi SSID. For security purposes, this identifier should be unique for your system. If your gateway is connected to an ACS, it is recommended that SSID names be be 1 - 32 characters long. Special characters are accepted.
BSSID	Displays the Basic Service Set Identifier (BSSID), the MAC address assigned to the wireless router.
Country	This option is set by default and cannot be changed. The wireless channel adjusts to the frequency provision for the selected country.
Country RegRev	This option is set to **871** and cannot be changed.
Max Clients	Enter the maximum number of clients that can access the route wirelessly. Options are **1** through the value set in the **Global Max Clients** field on the Wireless > Advanced page. The default is **20**. **Note:** Before you can change this setting, you must change the **Global Max Clients** setting.
Wireless - Guest/Virtual Access Points section	
Enabled	Click to enable a virtual wireless access point for guest access.
SSID	Enter the wireless SSID for guests to use.
Hidden	Click to hide the SSID from being broadcast publicly.
Isolate Clients	Click to prevent client PCs from communicating with one another.
Enable WMM Advertise	Click to stop the wireless from advertising Wireless Multimedia (WMM) functionality.

Field Name	Description
Enable WMF	Click to enable Wireless Multicast Forwarding (WMF).
Enable HSPOT	Click to enable Hotspot 2.0 access.
Max Clients	Enter the maximum number of clients that can connect to this access point.
BSSID	Displays the Basic Service Set Identifier or **N/A**.

Security

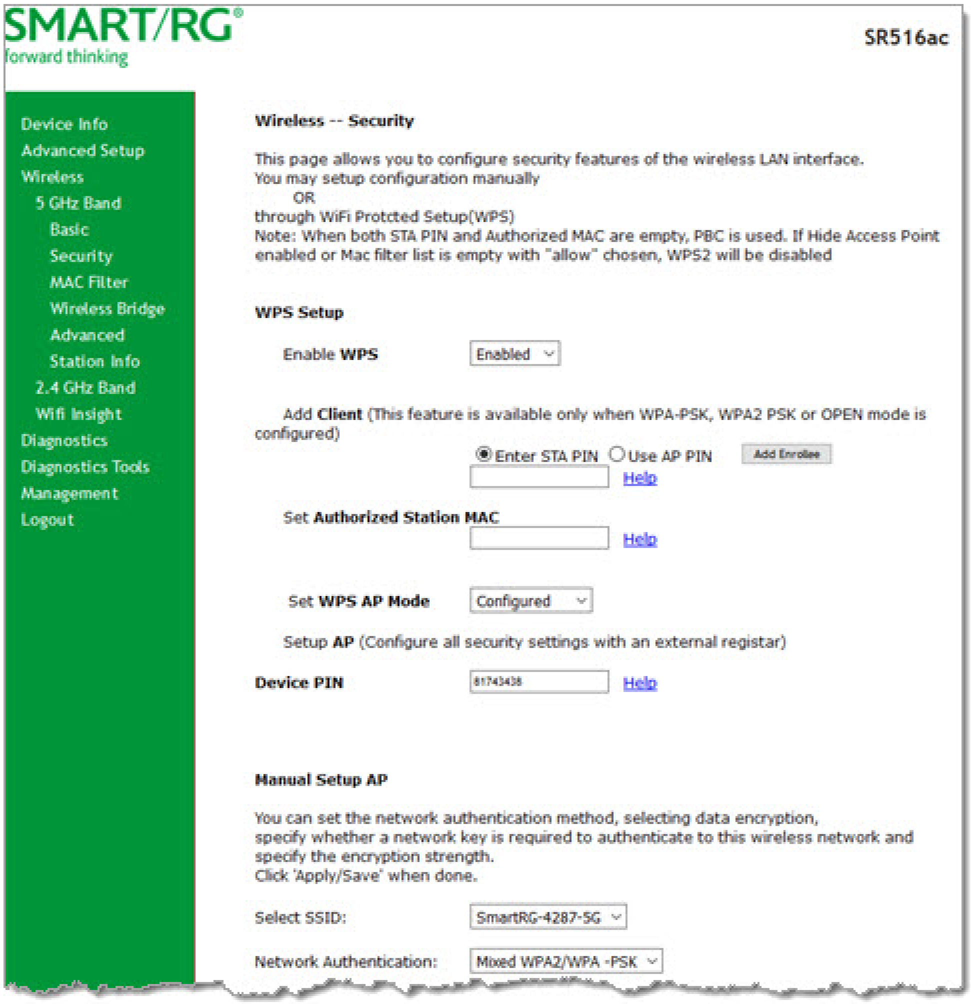
On this page, you can configure network security settings of a wireless LAN interface, either by using the WiFi Protected Setup (WPS) method or by setting the network authentication mode. For WiFi Protected Setup, the following methods are supported:

- **PIN entry:** Mandatory method of setup for all WPS-certified devices. Options are:
    - **Enter STA PIN**: You must enter the (input) station PIN from the client.
    - **Use AP PIN**: The access point (AP) generates the device PIN.
- **PBC (Push Button Configuration):** Uses a simulated push button in the software. (This is an optional method on wireless clients.)

Note: To use the PIN method, you need a Registrar (access point/wireless gateway) to initiate the registration between a new device and an active access point/wireless gateway. The PBC method may also need a Registrar when used in a special case where the PIN is all zeros.

Seven types of network authentication modes are supported: Open, Shared, 802.1X, WPA2, WPA2-PSK, Mixed WPA2/WPA, and Mixed WPA2/WPA-PSK.

1. In the left navigation bar, click Wireless > 5 GHz Band or 2.4 GHz Band > Security. The following page appears.



Wireless -- Security

This page allows you to configure security features of the wireless LAN interface.
You may setup configuration manually
OR
through WiFi Protcted Setup(WPS)
Note: When both STA PIN and Authorized MAC are empty, PBC is used. If Hide Access Point enabled or Mac filter list is empty with "allow" chosen, WPS2 will be disabled

WPS Setup

Enable **WPS**: Enabled

Add **Client** (This feature is available only when WPA-PSK, WPA2 PSK or OPEN mode is configured)

● Enter STA PIN ○ Use AP PIN

Set **Authorized Station MAC**

Set **WPS AP Mode**: Configured

Setup **AP** (Configure all security settings with an external registar)

Device PIN: 81743438

Manual Setup AP

You can set the network authentication method, selecting data encryption, specify whether a network key is required to authenticate to this wireless network and specify the encryption strength.
Click 'Apply/Save' when done.

Select SSID: SmartRG-4287-5G

Network Authentication: Mixed WPA2/WPA -PSK

2. Modify the settings as needed, using the information provided in the field description table below and in the sections that explain each authentication method.

The fields in the WPS Setup section are described in the following table.

Field Name	Description
Enable WPS	This option is enabled by default. To *disable* WiFi Protected Setup, select **Disabled**.
Add Client	(*Available for **WPA-PSK**, **WPA2-PSK** and **Open** Network Authentication methods*) Select the method for generating the WPS PIN. Options are: • **Enter STA PIN**: Type the input station PIN for the client in the field below the radio button. Click Add Enrollee. The PIN is verified.

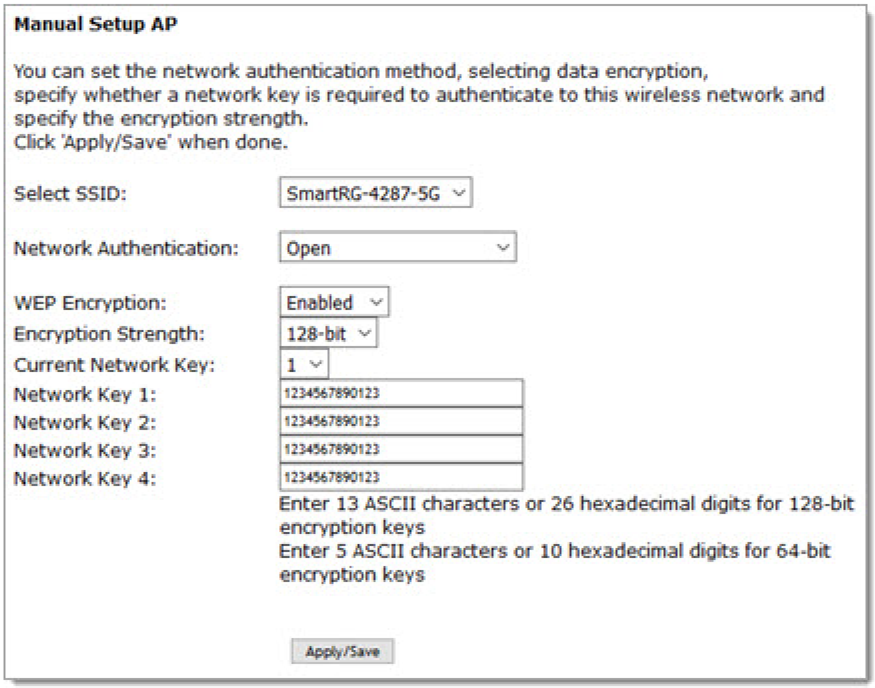
Field Name	Description
	- **Use AP PIN**: The entry field and the **Set Authorized Station MAC** field disappear. **Note:** If the **PIN** and **Set Authorized Station MAC** fields are left blank, the **PBC** (push-button) mode is automatically made active.
Set Authorized Station MAC	*(Available only when **Enter STA PIN** is selected)* Enter the MAC address of the authorized (input) station in format: xx:xx:xx:xx:xx:xx.
Set WPS AP Mode	Select how security is assigned to clients. - **Configured**: The gateway assigns security settings to clients. This is the default. - **Unconfigured**: An external client assigns security settings to the gateway.
Device PIN	This value is generated by the access point.

3. In the **Manual Setup AP** section, select the SSID for the device that you want to configure. The default is the 5 GHz wireless band defined for your gateway.
4. Select the **Network Authentication** method and then fill in the fields that appear. The default method is **Mixed WPA2 / WPA-PSK.** Detailed instructions are provided for each method in the following sections:
   - Open and Shared Authentication
   - 802.1X Authentication
   - WPA2 and Mixed WPA2/WPA Authentication
   - WPA2-PSK and Mixed WPA2/WPA-PSK Authentication
5. Click **Apply/Save** to commit your changes.

Open and Shared Authentication

The same configuration fields apply for both **Shared** and **Open** authentication types except that **WEP Encryption** is enabled by default for the **Shared** method.

The following fields appear when you select **Open** or **Shared** in the **Network Authentication** field and **WEP Encryption** is enabled.



Manual Setup AP

You can set the network authentication method, selecting data encryption,
specify whether a network key is required to authenticate to this wireless network and
specify the encryption strength.
Click 'Apply/Save' when done.

Select SSID:	SmartRG-4287-5G
Network Authentication:	Open
WEP Encryption:	Enabled
Encryption Strength:	128-bit
Current Network Key:	1
Network Key 1:	1234567890123
Network Key 2:	1234567890123
Network Key 3:	1234567890123
Network Key 4:	1234567890123

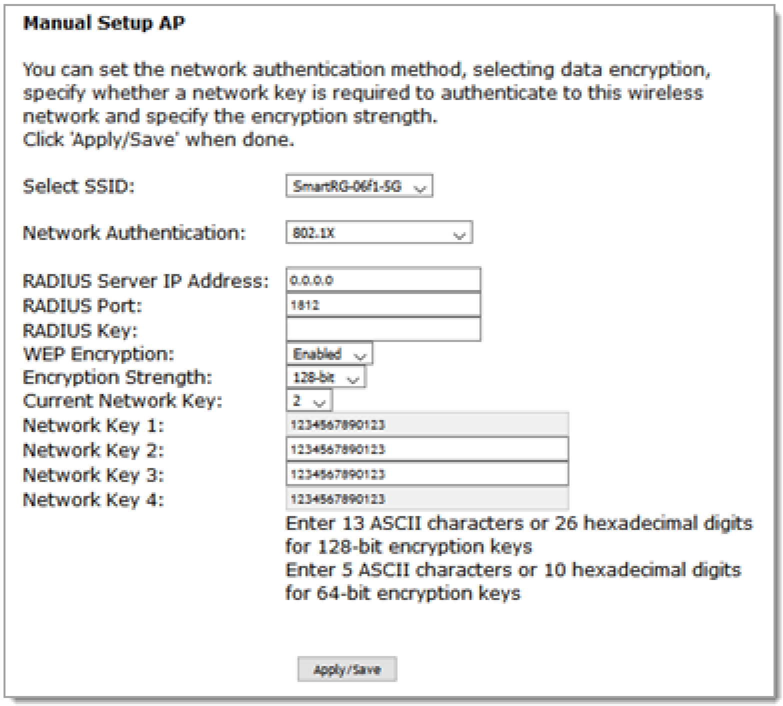
Enter 13 ASCII characters or 26 hexadecimal digits for 128-bit encryption keys
Enter 5 ASCII characters or 10 hexadecimal digits for 64-bit encryption keys

Modify the fields as needed and then click Apply/Save.

Field Name	Description
WEP Encryption	Select the Wired Equivalent Privacy (WEP) mode. Options are **Enabled** and **Disabled.** The default is **Disabled** for **Open** authentication and **Enabled** for **Shared** authentication.
Encryption Strength	Select the length of the encryption method. Options are **128-bit** and **64-bit**. **128-bit** is the default and is the more robust option for security.
Current Network Key	Select which of the four keys is presently in effect.
Network Key 1-4	Enter up to four encryption keys using the on-screen instructions to achieve the desired security strength.

802.1X Authentication

The following fields appear when you select **802.1X** in the Network Authentication field. WPS is disabled for this method.



Manual Setup AP

You can set the network authentication method, selecting data encryption, specify whether a network key is required to authenticate to this wireless network and specify the encryption strength.
Click 'Apply/Save' when done.

Select SSID: SmartRG-06f1-5G

Network Authentication: 802.1X

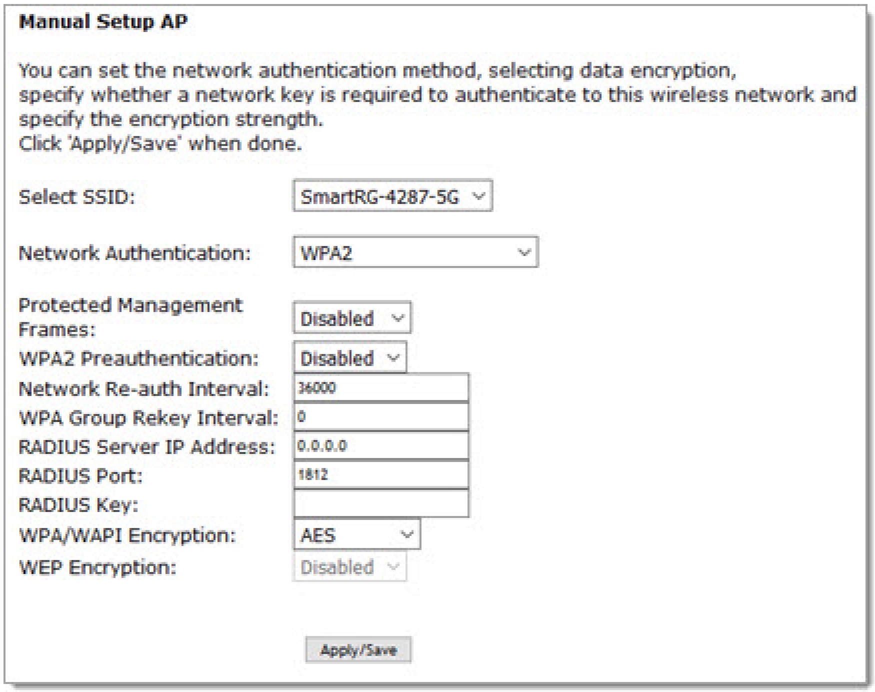
RADIUS Server IP Address: 0.0.0.0
RADIUS Port: 1812
RADIUS Key:
WEP Encryption: Enabled
Encryption Strength: 128-bit
Current Network Key: 2
Network Key 1: 1234567890123
Network Key 2: 1234567890123
Network Key 3: 1234567890123
Network Key 4: 1234567890123
Enter 13 ASCII characters or 26 hexadecimal digits for 128-bit encryption keys
Enter 5 ASCII characters or 10 hexadecimal digits for 64-bit encryption keys

Modify the fields as needed, using the information provided in the table below, and then click Apply/Save.

Field Name	Description
RADIUS Server IP address	Enter the IP address of the RADIUS (Remote Authentication Dial In User Service) server associated with your network. RADIUS server is used to authenticate the hosts on the wireless network.
RADIUS Port	Enter the port number for the RADIUS server. Port 1812 is the default and the current standard for RADIUS authentication per the IETF RFC 2865. Older servers may use port 1645. Options are **1** - **65535**.
RADIUS Key	(*Optional*) Enter the encryption key if needed to authenticate to the specified RADIUS server.
WEP Encryption	This option is set to **Enabled** and cannot be changed. It enables WEP (Wired Equivalent Privacy) mode.
Encryption Strength	Select the length of the encryption method. Options are **128-bit** and **64-bit**. **128-bit** is the default and is the more robust option for security.
Current Network Key	Select which of the four keys is presently in effect. The default is **2**.
Network Key 1-4	Enter up to two encryption keys using the on-screen instructions to achieve the desired security strength. Network Keys 1 & 4 are set automatically and cannot be changed.

WPA2 and Mixed WPA2/WPA Authentication

The following fields appear when you select **WPA2** or **Mixed WPA2/WPA** in the Network Authentication field.



Manual Setup AP

You can set the network authentication method, selecting data encryption, specify whether a network key is required to authenticate to this wireless network and specify the encryption strength.
Click 'Apply/Save' when done.

Select SSID:	SmartRG-4287-5G
Network Authentication:	WPA2
Protected Management Frames:	Disabled
WPA2 Preauthentication:	Disabled
Network Re-auth Interval:	36000
WPA Group Rekey Interval:	0
RADIUS Server IP Address:	0.0.0.0
RADIUS Port:	1812
RADIUS Key:	
WPA/WAPI Encryption:	AES
WEP Encryption:	Disabled

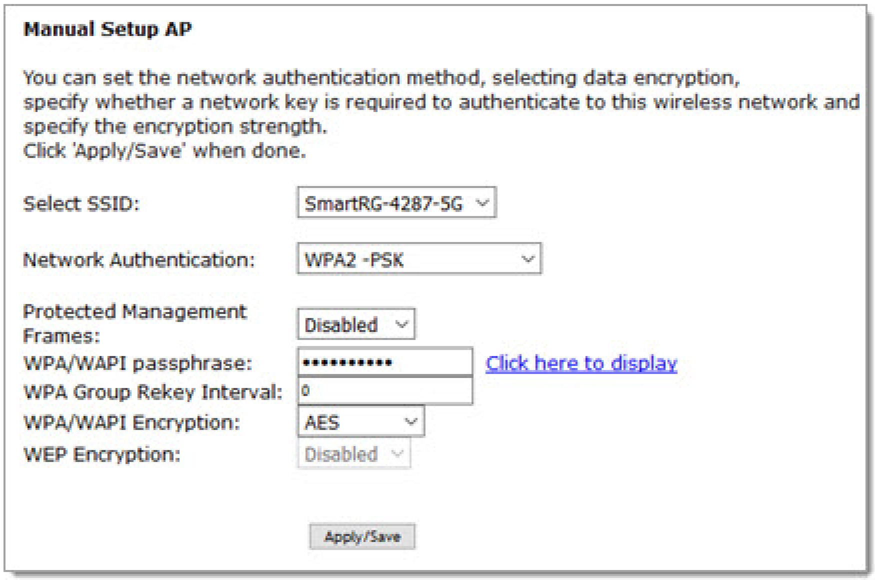
Modify the fields as needed, using the information provided in the table below, and then click **Apply/Save**.

Field Name	Description
Protected Management Frames	Select whether management frames are protected. Options are **Disabled**, **Capable**, and **Required**. The default is **Disabled**.
WPA2 Preauthentication	Select whether clients can pre-authenticate with the gateway while still connected to another AP. Options are **Enabled** and **Disabled**. The default is **Disabled**.
Network Re-Auth Interval	Enter the interval at which the client must re-authenticate with the gateway. The default is **36000** seconds (10 hours).
WPA Group Rekey Interval	Enter the frequency at which the gateway automatically updates the group key and sends it to connected LAN client devices. Options are **0** - **65535** seconds. The default is **0**.
RADIUS Server IP address	Enter the IP address of the RADIUS (Remote Authentication Dial In User Service) server associated with your network.
RADIUS Port	Enter the port number for the RADIUS server. Options are **1** - **65535**. Port **1812** is the default and is the current standard for RADIUS authentication per the IETF RFC 2865. Older servers may use port **1645**.
RADIUS Key	(*Optional*) Enter the encryption key needed to authenticate to the specified RADIUS Server.
WPA/WAPI Encryption	Select the encryption standard. This field is displays the option most compatible with the selected network authentication method. Options are:

Field Name	Description
	- **AES**: Advanced Encryption Standard. This is the default. - **TKIP+AES:** AES combined with TKIP (Temporary Key Integrity Protocol) allows access by either standard.
WEP Encryption	This option is set to **Disabled** and cannot be changed.

WPA2-PSK and Mixed WPA2/WPA-PSK Authentication

The following fields appear when you select **WPA2-PSK** or **Mixed WPA2/WPA-PSK** in the **Network Authentication** field.



Manual Setup AP

You can set the network authentication method, selecting data encryption, specify whether a network key is required to authenticate to this wireless network and specify the encryption strength.
Click 'Apply/Save' when done.

Select SSID:	SmartRG-4287-5G
Network Authentication:	WPA2 -PSK
Protected Management Frames:	Disabled
WPA/WAPI passphrase:	••••••••••• Click here to display
WPA Group Rekey Interval:	0
WPA/WAPI Encryption:	AES
WEP Encryption:	Disabled

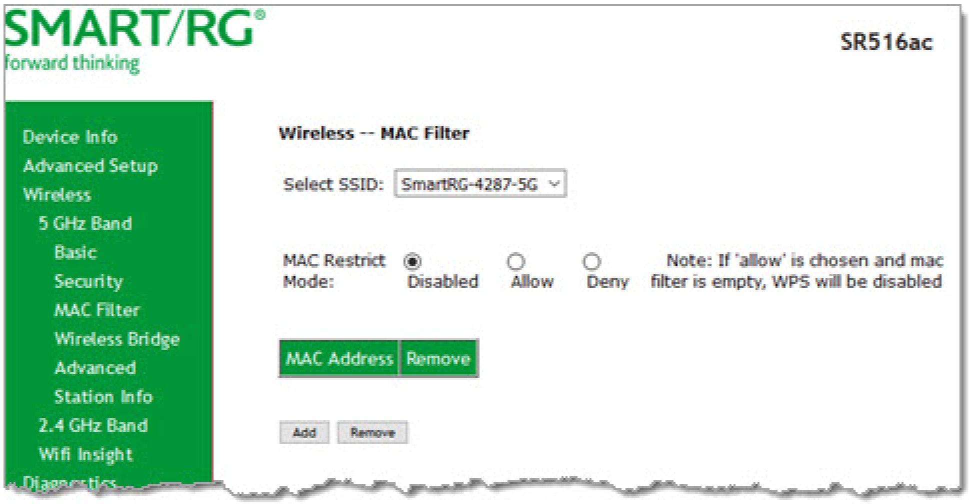
Modify the fields as needed, using the information provided in the table below, and then click **Apply/Save**.

Field Name	Description
Protected Management Frames	Select whether management frames are protected. Options are **Disabled**, **Capable**, and **Required**. The default is **Disabled**.
WPA/WAPI passphrase	Enter the security password to be used by this security configuration. When you click **Click here to display**, the passphrase appears in a separate window.
WPA Group Rekey Interval	Enter the frequency at which the gateway automatically updates the group key and sends it to connected LAN client devices. The default is **0**.
WPA/WAPI Encryption	Select the encryption standard. This field is displays the option most compatible with the selected network authentication method. Options are: - **AES**: Advanced Encryption Standard. - **TKIP+AES:** AES combined with TKIP (Temporary Key Integrity Protocol).
WEP Encryption	This option is set to **Disabled** and cannot be changed. It disables WEP (Wired Equivalent Privacy) mode.

MAC Filter

On this page, you can configure whether wireless clients are allowed to access the wireless network of the wireless gateway.

1. In the left navigation bar, click **Wireless** > **MAC Filter**. The following page appears.



Wireless -- MAC Filter

Select SSID: SmartRG-4287-5G

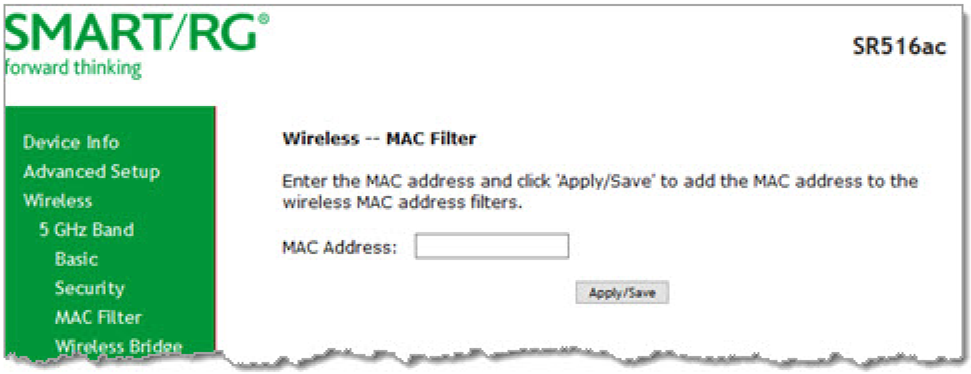
MAC Restrict Mode: ● Disabled ○ Allow ○ Deny   Note: If 'allow' is chosen and mac filter is empty, WPS will be disabled

MAC Address	Remove

Add   Remove

2. In the **Select SSID** field, select the access point that you want to configure.
3. Select the **MAC Restrict Mode**. Options are:
   - **Disabled**: Disable wireless MAC address filtering. This is the default.
   - **Allow**: Allow the wireless clients in the **MAC Address** list to access the wireless network.

     Note: For this option to work, you must add at least one MAC address to this page.
   - **Deny**: Reject requests from the wireless clients in the **MAC Address** list to access the wireless network.
4. To add a **MAC Address** to the filter list:
   a. Click **Add**. The following page appears.



Wireless -- MAC Filter

Enter the MAC address and click 'Apply/Save' to add the MAC address to the wireless MAC address filters.

MAC Address:

Apply/Save

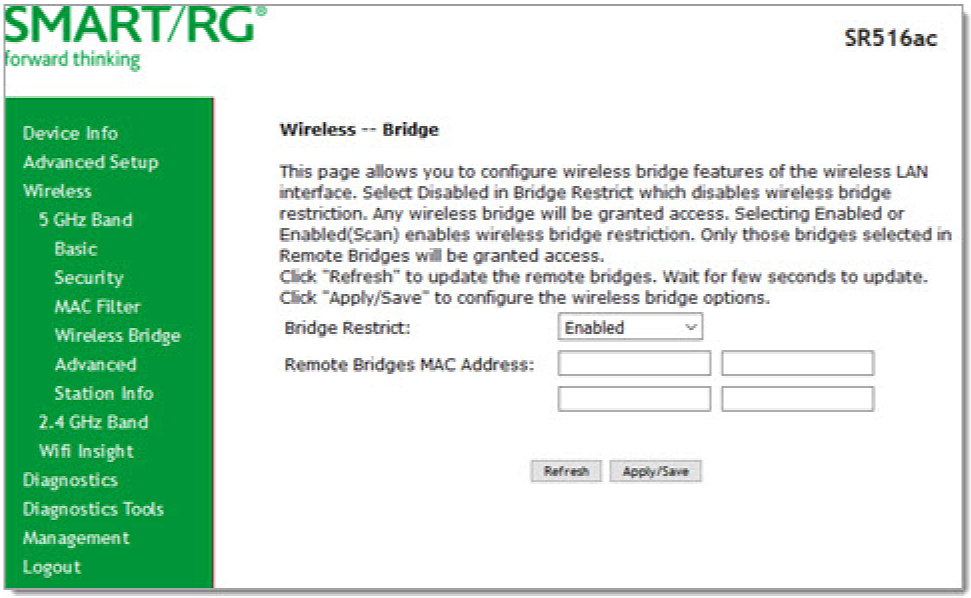
   b. Enter the **MAC address** of the wireless client.
   c. Click **Apply/Save** to save the address to the list. You are returned to the Wireless - MAC Filter landing page.

5. To remove a MAC address from the list, click the **Remove** check box next to it and then click the **Remove** button. The list refreshes.

Wireless Bridge

On this page, you can configure the wireless bridge features of the wireless LAN interface.

1. In the left navigation menu, click **Wireless** > **Wireless Bridge**. The following page appears.



Wireless -- Bridge

This page allows you to configure wireless bridge features of the wireless LAN interface. Select Disabled in Bridge Restrict which disables wireless bridge restriction. Any wireless bridge will be granted access. Selecting Enabled or Enabled(Scan) enables wireless bridge restriction. Only those bridges selected in Remote Bridges will be granted access.
Click "Refresh" to update the remote bridges. Wait for few seconds to update.
Click "Apply/Save" to configure the wireless bridge options.

Bridge Restrict: Enabled

Remote Bridges MAC Address:

2. Modify the fields as needed, using the information provided in the table below.

Field Name	Description
Bridge Restrict	Enable or disable the bridge restrict function for MAC addresses in the **Remote Bridges MAC Address** field. Options are: • **Enabled**: Allow only those bridges selected in the **Remote Bridges MAC Address** table to access the wireless LAN. This is the default. • **Enabled (Scan):** Allow only those bridges selected in the **Remote Bridges MAC Address** table to access the wireless LAN but the scanning feature is active. • **Disabled**: Disable the wireless MAC address filtering function. Any wireless bridge can access the wireless LAN.
Remote Bridges MAC Address	Enter up to four MAC addresses for the remote bridges that are allowed to access the wireless LAN.

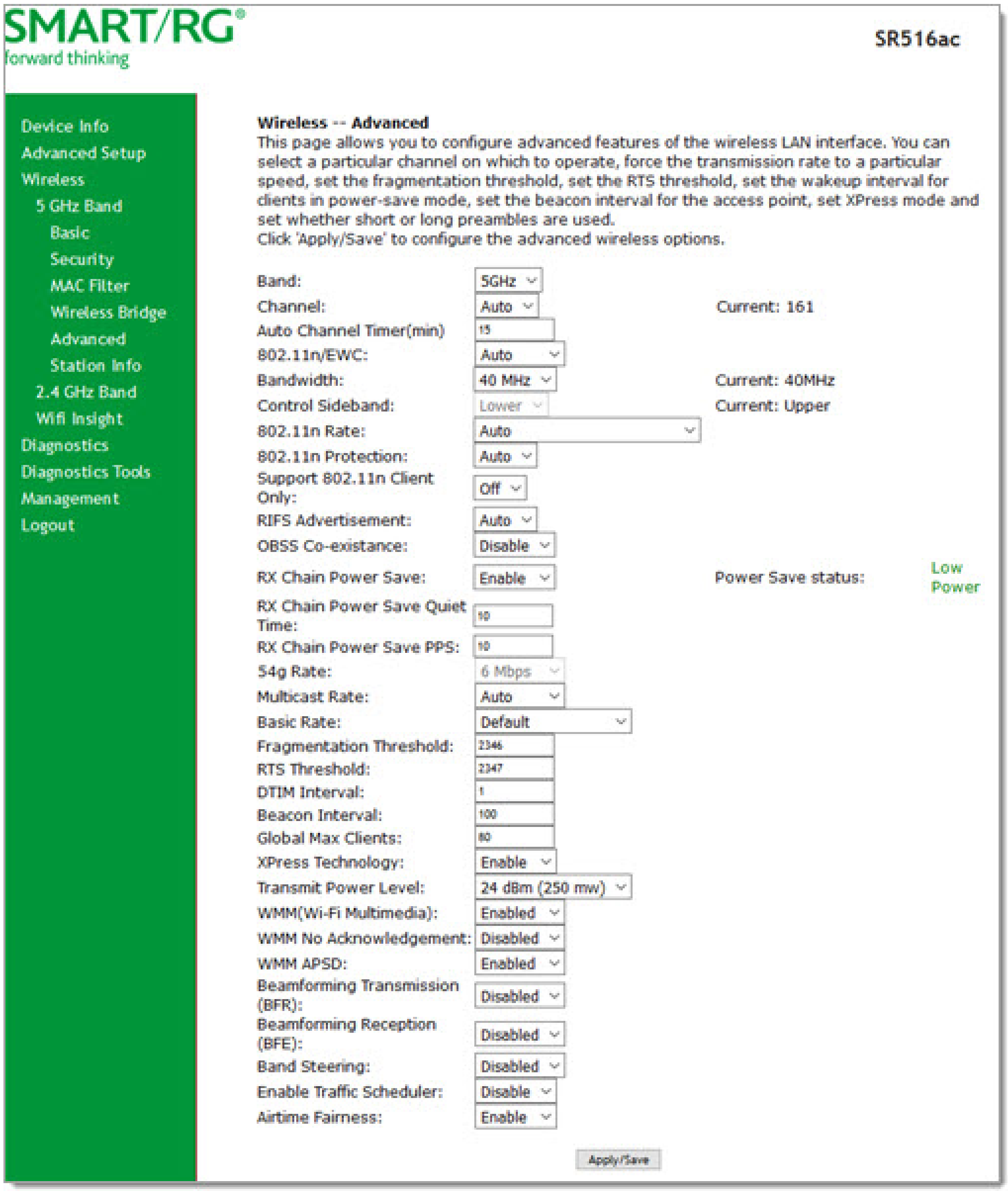
3. Click **Apply/Save** to save your settings.

Advanced

On this page, you can configure the advanced features of the wireless LAN interface. You can select a particular channel on which to operate, force the transmission rate to a desired speed, set the fragmentation threshold, the RTS threshold, the wakeup interval for clients in power-save mode, and more.

Note: The default settings work for most environments. It is recommended that only experienced users change settings on this page.

1. In the left navigation bar, click Wireless > Advanced. The following page appears.



Wireless -- Advanced

This page allows you to configure advanced features of the wireless LAN interface. You can select a particular channel on which to operate, force the transmission rate to a particular speed, set the fragmentation threshold, set the RTS threshold, set the wakeup interval for clients in power-save mode, set the beacon interval for the access point, set XPress mode and set whether short or long preambles are used.
Click 'Apply/Save' to configure the advanced wireless options.

Band:	5GHz		
Channel:	Auto	Current: 161	
Auto Channel Timer(min)	15		
802.11n/EWC:	Auto		
Bandwidth:	40 MHz	Current: 40MHz	
Control Sideband:	Lower	Current: Upper	
802.11n Rate:	Auto		
802.11n Protection:	Auto		
Support 802.11n Client Only:	Off		
RIFS Advertisement:	Auto		
OBSS Co-existance:	Disable		
RX Chain Power Save:	Enable	Power Save status:	Low Power
RX Chain Power Save Quiet Time:	10		
RX Chain Power Save PPS:	10		
54g Rate:	6 Mbps		
Multicast Rate:	Auto		
Basic Rate:	Default		
Fragmentation Threshold:	2346		
RTS Threshold:	2347		
DTIM Interval:	1		
Beacon Interval:	100		
Global Max Clients:	80		
XPress Technology:	Enable		
Transmit Power Level:	24 dBm (250 mw)		
WMM(Wi-Fi Multimedia):	Enabled		
WMM No Acknowledgement:	Disabled		
WMM APSD:	Enabled		
Beamforming Transmission (BFR):	Disabled		
Beamforming Reception (BFE):	Disabled		
Band Steering:	Disabled		
Enable Traffic Scheduler:	Disable		
Airtime Fairness:	Enable		

2. Modify the fields as needed, using the information in the following table.
3. Click **Apply/Save** to commit your changes.

Field Name	Description
Band	The only option for this field is the band selected in the left menu.
Channel	Select the Wi-Fi channel you want to use. The current channel number displays to the right of the field. For the 5GHz band, options are **Auto** and **36** through **157**. For the 2.4GHz band, options are **Auto** and **1** - **7**. The default is **Auto**. All devices in your wireless network must use the same channel in order to work correctly.
Auto Channel Timer (min)	Enter the frequency (in minutes) at which the gateway scans channels for interference. If a threshold of inference is detected, a new channel will be selected automatically. Options are **0** - **65535** minutes. The default is **15** minutes.
802.11n/EWC	Select whether to enable this standard. Options are **Auto** and **Disabled**. The default is **Auto**. For detailed information about this standard, refer to IEEE 802.11n Draft 2.0.
Bandwidth	Select the operating bandwidth. Options are **20 MHz**and **40 MHz**. The default is **40MHz**. The current bandwidth setting displays to the right of the field.
Control Sideband	Select whether to use the lower or upper bands. Options are **Lower** and **Upper**. The default is **Lower**.
802.11n rate	Select the desired physical transmission rate. The rate of data transmission should be set depending on the speed of your wireless network. You can select from a range of transmission speeds (**0** - **15**), select **Use 54g Rate**, or select **Auto** to have the gateway automatically use the fastest possible data rate and enable the **Auto-Fallback** feature. Auto-Fallback will negotiate the best possible connection speed between the gateway and a wireless client. The default is **Auto**.
802.11n protection	Select whether to enable 802.11n and legacy clients to both work effectively on the network. Options are: • **Auto**: Provides maximum security but produces a noticeable impact on throughput. With this option, RTS/CTS behavior permits legacy clients to become aware of 802.11n transmit times, but decreases overall throughput. This is the default. • **Off**: Provides better throughput.
Support 802.11n client only	Select whether to restrict 802.11b/g clients from accessing the gateway. Options are **On** and **Off**. The default is **Off**.
RIFS Advertisement	RIFS (Reduced InterFrame Speed) is the time in micro seconds by which the multiple transmissions from a single station is separated. This option Improves performance by reducing dead time required between OFDM transmission. Options are **Auto** and **Off**. The default is **Auto**.
OBSS Co-Existence	Coexistence of Overlapping Basic Service Sets (OBSS) prevents overlapping in the 20 MHz and 40 MHz frequencies. Options are: • **Enable**: The gateway automatically reverts to 20 MHz channel bandwidth when another WiFi network within 2 channels of its own channel is detected or when a client device with its 40

Field Name	Description
	MHz Intolerant bit set is detected. • **Disable:** The gateway advertises and operates in 40 MHz mode regardless of how other nearby networks are configured. This is the default.
RX Chain Power Save	Select whether power-save mode is enabled. Options are **Disable** and **Enable**. The default is **Enable**. **Note:** Before setting this parameter, make sure that **802.11n/EWC** is set to **Auto**.
RX Chain Power Save Quiet Time	Enter the number of minutes that will elapse before quiet time begins. The default is **10** minutes.
RX Chain Power Save PPS	Enter the throughput threshold (in seconds) for when the router engages power save mode after the quiet time period has elapsed. The default is **10** seconds.
54g Rate	This option is set to **1 Mbps** and cannot be changed.
Multicast rate	Select the multicast transmission rate for the network according to the speed of your wireless network. Select from a range of transmission speeds or select **Auto** to have the gateway automatically use the fastest possible data rate and enable the **Auto-Fallback** feature. Auto-Fallback will negotiate the best possible connection speed between the gateway and a wireless client. Options are **Auto** and **1** - **54** Mbps. The default value is **Auto**.
Basic Rate	Select the basic transmission rate ability for the AP. Options are **Default**, **All**, **1 & 2 Mbps, and 1 & 2 & 5.5 & 6 & 11 & 12 &24 Mbps**. The default is **Default**.
Fragmentation Threshold	Enter the size at which packets will be fragmented into smaller units. The primary consideration for this setting is the size/capability of the circuit. Options are **256** - **2346** bytes. The default is **2346** bytes. **Note:** A high packet error rate is an indication that a slightly increased fragmentation threshold is needed. When possible, the default value of **2346** bytes should be maintained. Poor throughput is a likely result of setting this threshold too low.
RTS Threshold	The gateway sends Request to Send (RTS) frames to a particular receiving station and negotiates the sending of a data frame. After receiving an RTS, the wireless station responds with a Clear to Send (CTS) frame to acknowledge the right to begin transmission. If a packet is smaller than this setting, the WLAN client hardware does not invoke its RTS/CTS mechanism. Options are **256** - **2347** bytes. The default value of **2347** (disabled) should be left in place unless you encounter inconsistent data flow. In that case, make small reductions to this value until the issue is resolved.
DTIM Interval	Enter the Delivery Traffic Indication Message (DTIM or Beacon rate) countdown variable used to indicate when the next window is available to client devices for listening to buffered broadcast and multicast messages. Options are **1** - **255**. The default is **1**.
Beacon Interval	Beacon information packets are sent from a connected device to all other devices where it announces its availability and readiness. A beacon interval is the period of time (sent with the

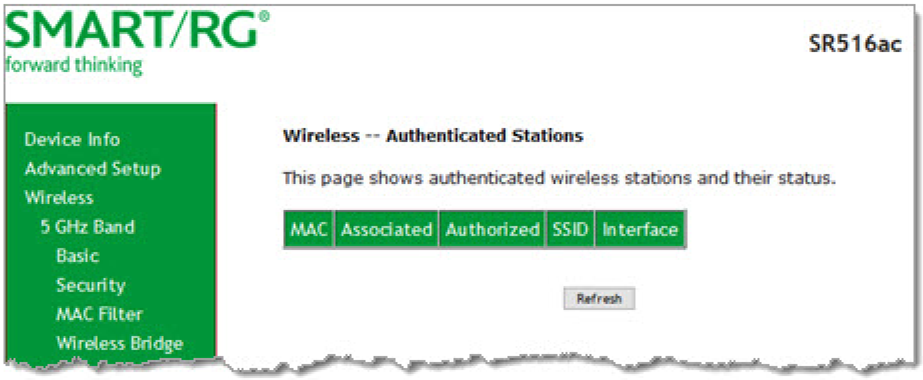
Field Name	Description
	beacon) that the device waits before sending the beacon again. Enter the time interval (in milliseconds) between beacon transmissions. Options are **1** - **65535** ms. The default is **100** ms, which is recommended.
Global Max Clients	Enter the maximum number of clients that can assess this wireless network at one time. The maximum for 5 GHz is **80**; the maximum for 2.4 GHz is **128**. The default is the maximum. **Note**: You must change this field before you can change the **Max Clients** on the Wireless > Basic. page.
Xpress™ Technology	Select whether to enable Xpress Technology, a special accelerating technology for IEEE802.11g. Options are **Enable** and **Disable**. The default is **Enable**.
Transmit Power Level	Select the level of power used for transmittals. Options range from **4 dBm (2mw)** to **18dBm (60 mw)**. The default is **18 dBm (60 mw)**.
WMM (WiFi Multimedia)	This technology allows multimedia services (audio, video and voice packets) to get higher priority for transmission. Options are **Auto**, **Enabled**, and **Disabled**. The default is **Enabled**. **Warning**: If you disable this option, all QoS queues and classifications defined for the wireless network are also disabled.
WMM No Acknowledgment	The acknowledge policy used at the MAC level. Enabling this option allows better throughput but, in a noisy RF environment, higher -963 error rates may result. The default is **Disabled**, meaning that an acknowledgment packet is returned for every packet received. This provides a more reliable transmission but increases traffic load, which decreases performance. Disabling the acknowledgment can be useful for Voice, for example, where speed of transmission is important and packet loss is tolerable to a certain degree. Options are **Enabled** and **Disabled**. The default is **Disabled**.
WMM APSD	APSD (Automatic Power Save Delivery) is an automatic power saving feature. Enabling ensures very low power consumption. WMM Power Save is an improvement to the 802.11e amendment, adding advanced power management functionality to WMM. Options are **Enabled** and **Disabled**. The default is **Enabled**.
Beamforming Transmission (BFR)	Select to concentrate the transmission signal at the gateway location. This results in a better signal and potentially better throughput. Options are **Disabled**, **SU BFR**, and **MU BFR**. The default is **Disabled**.
Beamforming Reception (BFE)	Select to concentrate the transmission signal at the gateway location. Options are **Disabled**, **SU BFE**, and **MU BFE**. The default is **Disabled**.
Band Steering	Select whether to detect if the client has the ability to use two bands. When enabled, the less-congested 5GHz network is selected (by blocking the client's 2.4GHz network). Options are **Disabled** and **Enabled**. The default is **Disabled**.
Enable Traffic Scheduler	Select whether to enable scheduling of traffic to improve efficienty and increase usable bandwidth for some types of packets by delaying other types. Options are **Disable** and **Enable**. The default is **Disable**.

Field Name	Description
Airtime Fairness	Select how the gateway will manage the receiving signal with other devices. Options are **Disable** and **Enable**. The default is **Enable**.

Station Info

On this page, you can view the authenticated wireless stations and their status.

In the left navigation menu, click Wireless > Station Info. The following page appears.



Wireless -- Authenticated Stations

This page shows authenticated wireless stations and their status.

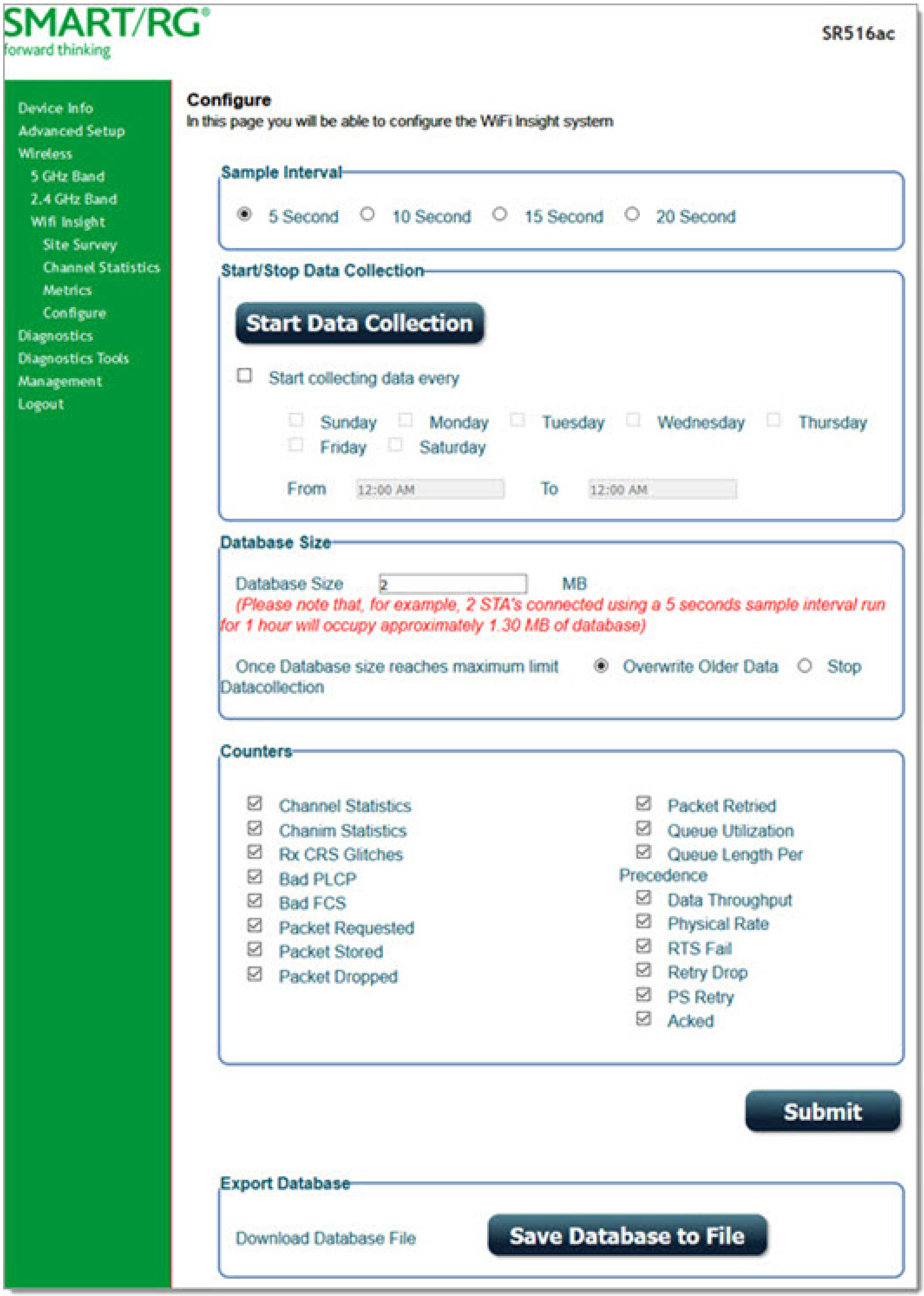
MAC	Associated	Authorized	SSID	Interface

To update the data, click Refresh.

Wifi Insight

On this page, you can configure the WiFi Insight system.

1. In the left navigation menu, click **Wireless** > **Wifi Insight**. The following page appears. You can also reach this page by clicking **Wireless** > **Wifi Insight** > **Configure**.



SMART/RG® forward thinking

SR516ac

Configure

In this page you will be able to configure the WiFi Insight system

Sample Interval

● 5 Second ○ 10 Second ○ 15 Second ○ 20 Second

Start/Stop Data Collection

Start Data Collection

□ Start collecting data every

□ Sunday □ Monday □ Tuesday □ Wednesday □ Thursday
□ Friday □ Saturday

From 12:00 AM To 12:00 AM

Database Size

Database Size 2 MB

(Please note that, for example, 2 STA's connected using a 5 seconds sample interval run for 1 hour will occupy approximately 1.30 MB of database)

Once Database size reaches maximum limit ● Overwrite Older Data ○ Stop Datacollection

Counters

☑ Channel Statistics
☑ Chanim Statistics
☑ Rx CRS Glitches
☑ Bad PLCP
☑ Bad FCS
☑ Packet Requested
☑ Packet Stored
☑ Packet Dropped

☑ Packet Retried
☑ Queue Utilization
☑ Queue Length Per Precedence
☑ Data Throughput
☑ Physical Rate
☑ RTS Fail
☑ Retry Drop
☑ PS Retry
☑ Acked

Submit

Export Database

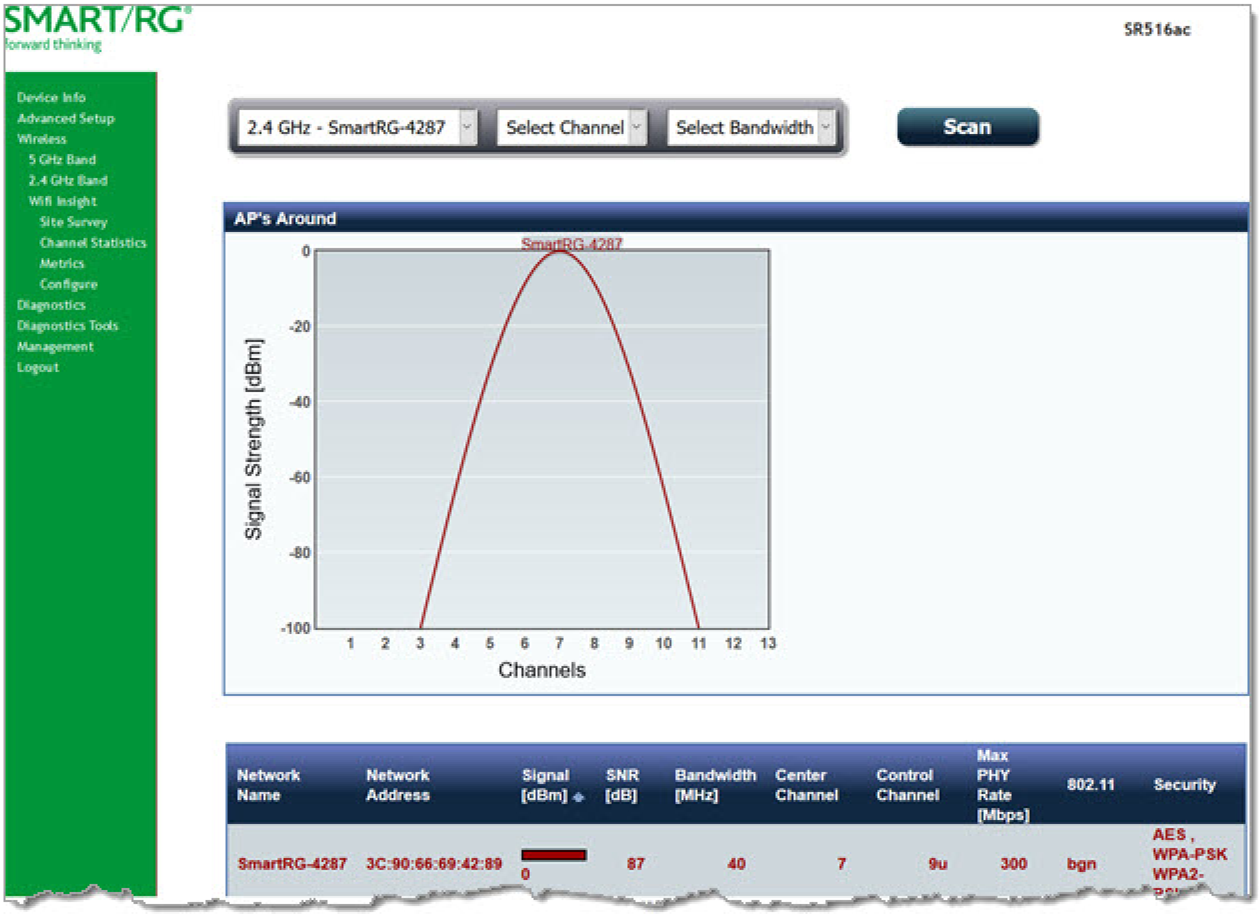
Download Database File Save Database to File

2. In the **Sample Interval** section, select the number of seconds for sampling to occur. Options are **5**, **10**, **15**, and **20** seconds. The default is **5** seconds.
3. In the **Start/Stop Data Collection** section, configure the data sample:
   a. Click **Start collecting data every**.
   b. Select the days of the week when the data should be collected.
   c. In the **From** and **To** fields, enter the start and end times for collection.
4. In the **Database Size** section, configure the database size limits:
   a. In the **Database Size** field, enter the maximum size for the database file where the collected data will be stored. The default is **2** MB.
   b. (*Optional*) Select whether to stop data collection when the maximum size is reached. Options are **Overwrite Older Data** and **Stop Datacollection**. The default is **Overwrite Older Data**.
5. (*Optional*) In the **Counters** section, clear any counter options that you do not need. The default is to collect all counters.
6. Click **Submit** to save the configuration.
7. To export a database, in the **Export Database** section:
   1. Click **Save Database to File**. The open/save dialog box appears.
   2. Click **OK** to save or click **Open** and **OK** to view.

Site Survey

On this page, you can view signal strength and other details for your wireless networks.

1. In the left navigation menu, click Wireless > Wifi Insight > Site Survey. The following page appears.



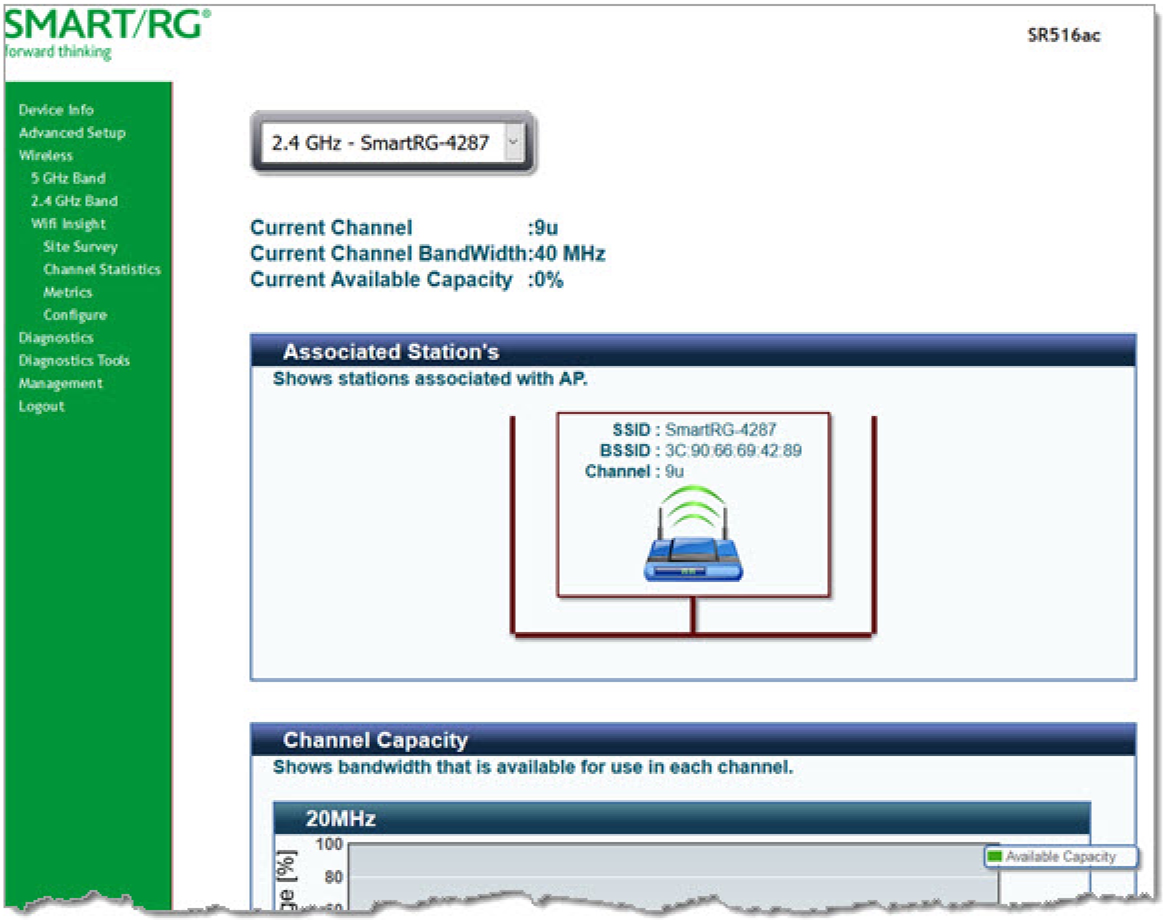
Network Name	Network Address	Signal [dBm]	SNR [dB]	Bandwidth [MHz]	Center Channel	Control Channel	Max PHY Rate [Mbps]	802.11	Security
SmartRG-4287	3C:90:66:69:42:89	0	87	40	7	9u	300	bgn	AES , WPA-PSK WPA2-

2. In the first field above the chart, select the wireless network that you want to review.
3. In the Select Channel field, select the channel that you want to review.
4. In the Select Bandwidth field, select the bandwidth.
5. Click Scan. The page refreshes to show the requested information.

Channel Statistics

On this page, you can view signal strength, channel capacity, interference, and other details for specific channels.

In the left navigation menu, click Wireless > Wifi Insight > Channel Statistics. The following page appears.



Current Channel :9u
Current Channel BandWidth:40 MHz
Current Available Capacity :0%

Associated Station's
Shows stations associated with AP.

SSID : SmartRG-4287
BSSID : 3C:90:66:69:42:89
Channel : 9u

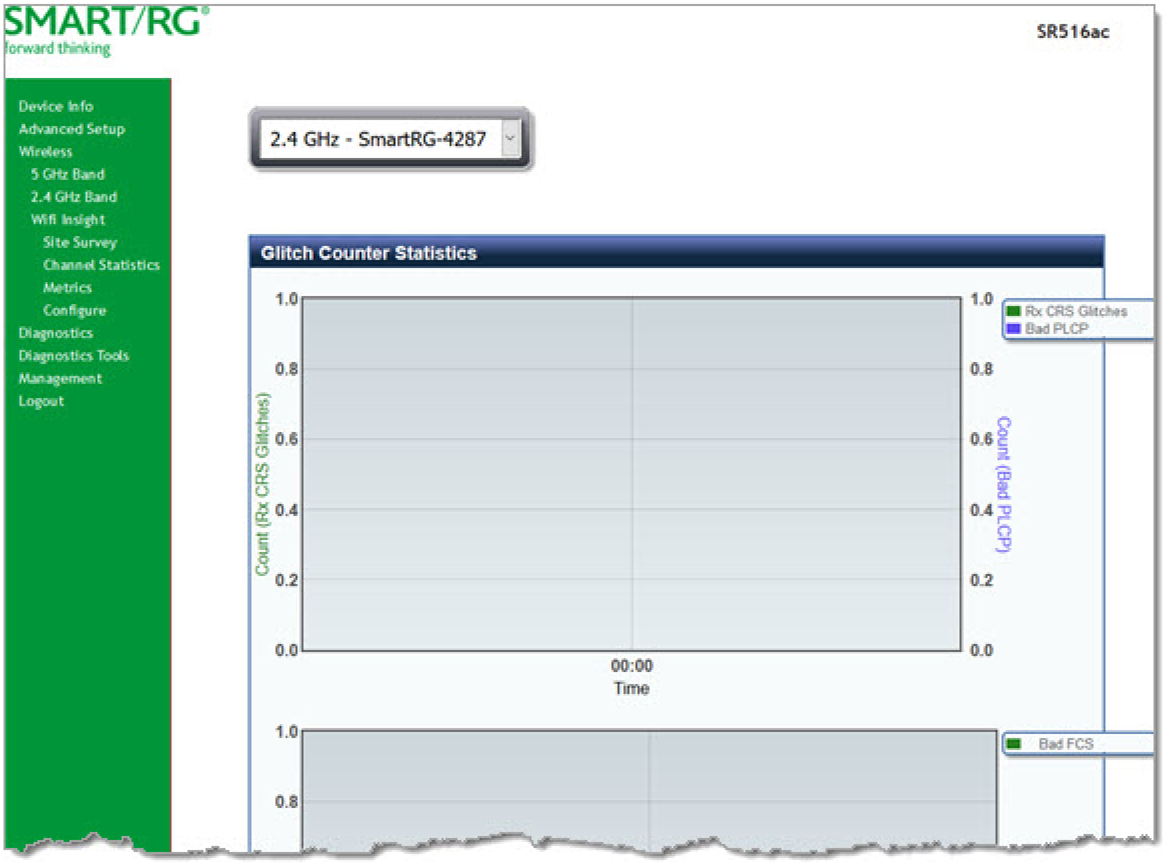
Channel Capacity
Shows bandwidth that is available for use in each channel.

20MHz

Metrics

On this page, you can view glitch counter, chanim, associated stations, and packet queue statistics for your wireless networks.

In the left navigation menu, click **Wireless** > **Wifi Insight** > **Metrics**. The following page appears.



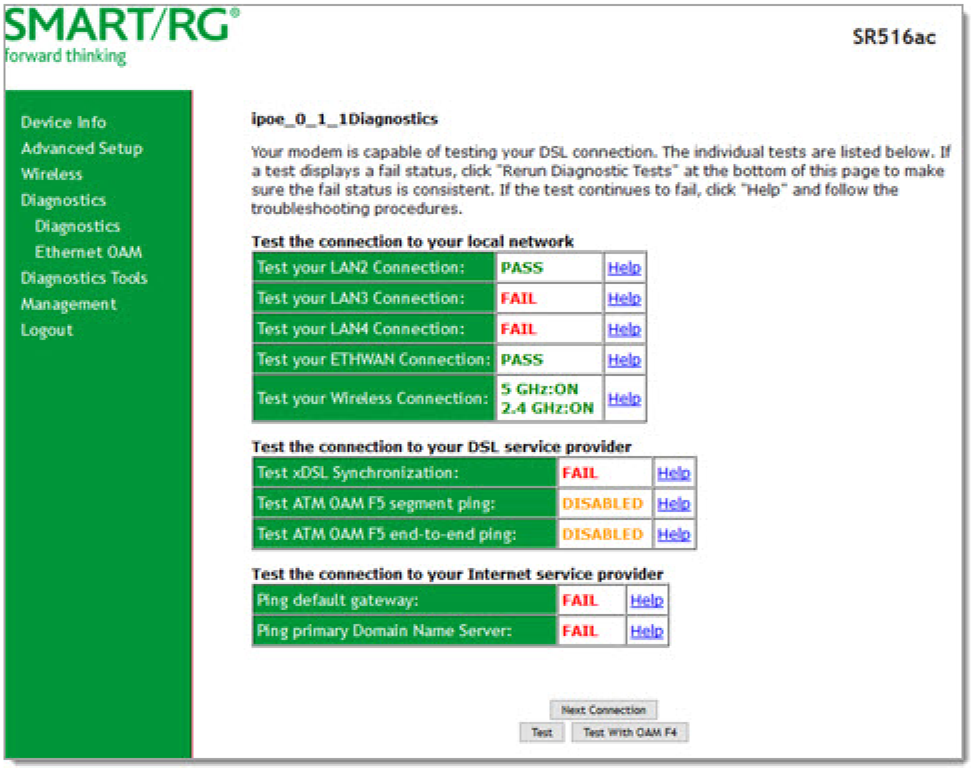
Diagnostics

Line performance diagnostic tools are supported by your SmartRG gateway. Three legs of the data path are included in the available tests: LAN connectivity, DSL connectivity, and Internet connectivity tests.

Diagnostics

On this page, you can test the connection to your local network, the connection to your DSL service provider, and the connection to your Internet service provider.

1. In the left navigation bar, click **Diagnostics**. The following page appears, showing information about the connection encountered by the gateway.



ipoe_0_1_1Diagnostics

Your modem is capable of testing your DSL connection. The individual tests are listed below. If a test displays a fail status, click "Rerun Diagnostic Tests" at the bottom of this page to make sure the fail status is consistent. If the test continues to fail, click "Help" and follow the troubleshooting procedures.

Test the connection to your local network

Test your LAN2 Connection:	PASS	Help
Test your LAN3 Connection:	FAIL	Help
Test your LAN4 Connection:	FAIL	Help
Test your ETHWAN Connection:	PASS	Help
Test your Wireless Connection:	5 GHz:ON 2.4 GHz:ON	Help

Test the connection to your DSL service provider

Test xDSL Synchronization:	FAIL	Help
Test ATM OAM F5 segment ping:	DISABLED	Help
Test ATM OAM F5 end-to-end ping:	DISABLED	Help

Test the connection to your Internet service provider

Ping default gateway:	FAIL	Help
Ping primary Domain Name Server:	FAIL	Help

2. To run a test (and refresh the data), click the appropriate **Test** button.

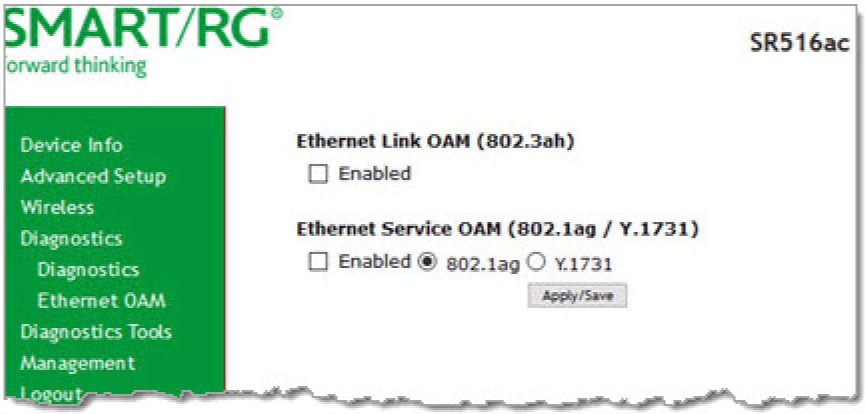
   The table is updated with fresh diagnostic information regarding connection integrity.

3. To test another connection, click **Next Connection**. The data refreshes and the **Previous Connection** button appears.
4. If a test fails, click the **Help** link located in the last column to learn more about what is being tested and what actions you can take.

Ethernet OAM

On this page, you can view diagnostics regarding your VDSL PTM or Ethernet WAN connection. Fault Management is compliant with IEEE 802.1ag for Connectivity Fault Management.

1. In the left navigation bar, click Diagnostics > Ethernet OAM. The following page appears.



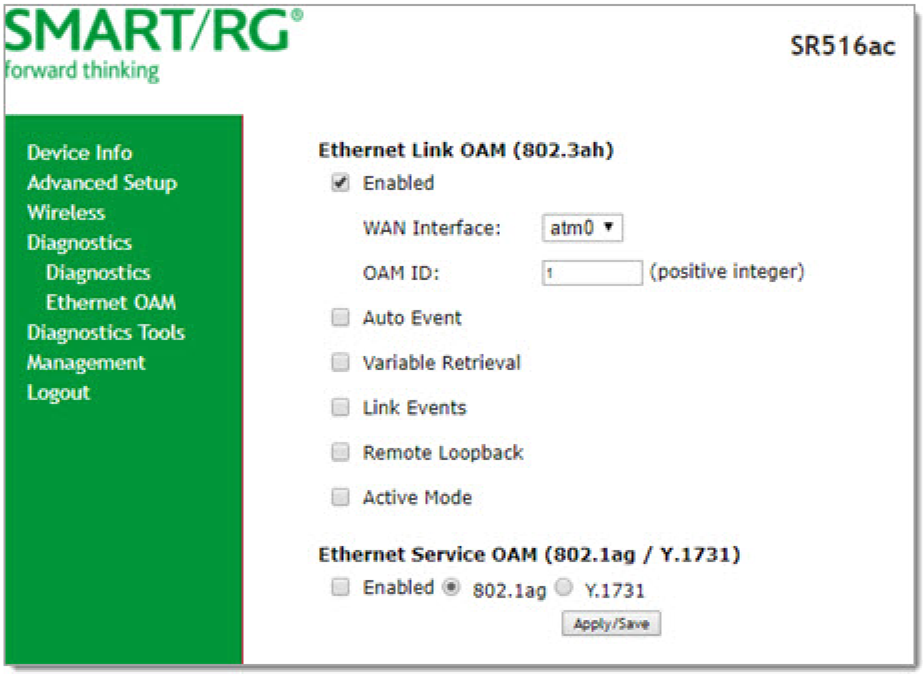
Ethernet Link OAM (802.3ah)

□ Enabled

Ethernet Service OAM (802.1ag / Y.1731)

□ Enabled ● 802.1ag ○ Y.1731

2. To enable Ethernet Link OAM (802.3ah):
   a. Click the **Enabled** checkbox. Additional fields appear.



Ethernet Link OAM (802.3ah)

☑ Enabled

WAN Interface: atm0

OAM ID: 1 (positive integer)

□ Auto Event

□ Variable Retrieval

□ Link Events

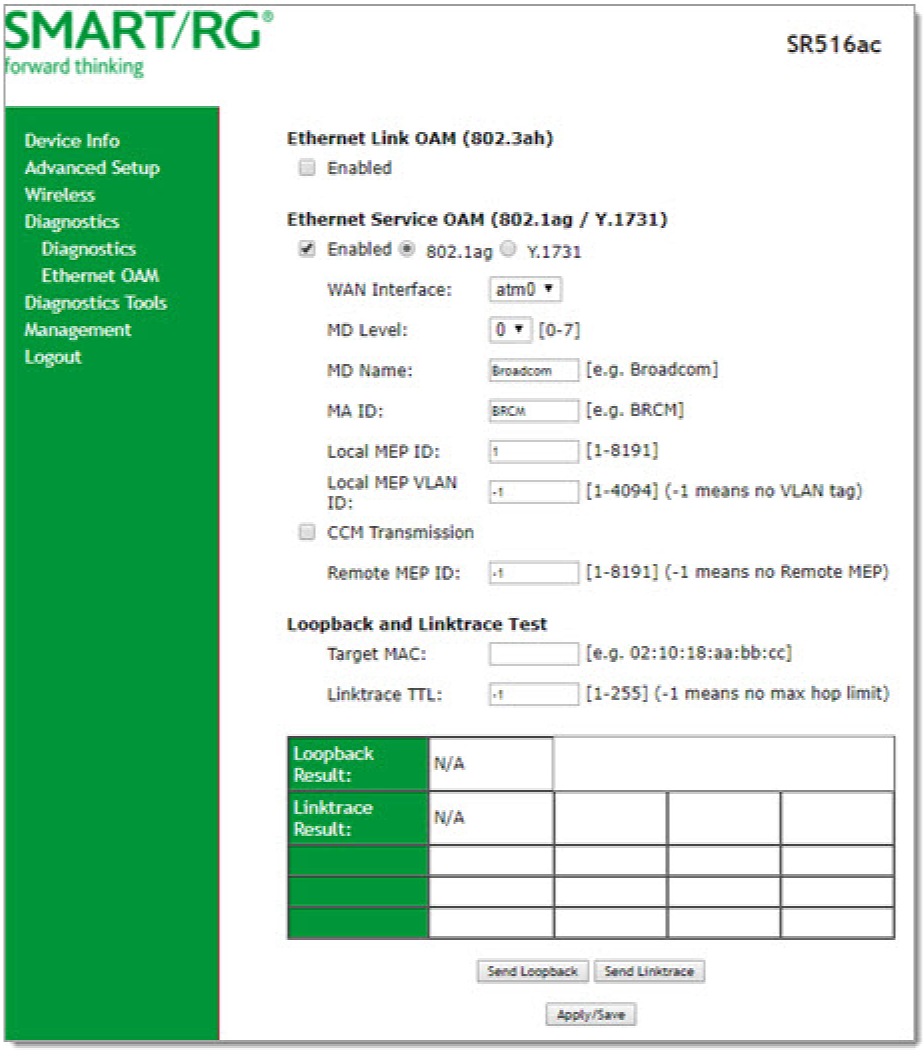
□ Remote Loopback

□ Active Mode

Ethernet Service OAM (802.1ag / Y.1731)

□ Enabled ● 802.1ag ○ Y.1731

   b. Modify the fields as needed, using the information in the Ethernet Link OAM (802.3ah) section of the table below.
3. To enable Ethernet Service OAM (802.1ag/Y.1731):
   a. Click the **Enabled** checkbox. Additional fields appear showing values for 802.1ag. To configure Y.1731, click the Y.1731 radio button. The page refreshes.



Ethernet Link OAM (802.3ah)

□ Enabled

Ethernet Service OAM (802.1ag / Y.1731)

☑ Enabled ● 802.1ag ○ Y.1731

WAN Interface:	atm0 ▾	
MD Level:	0 ▾	[0-7]
MD Name:	Broadcom	[e.g. Broadcom]
MA ID:	BRCM	[e.g. BRCM]
Local MEP ID:	1	[1-8191]
Local MEP VLAN ID:	-1	[1-4094] (-1 means no VLAN tag)

□ CCM Transmission

Remote MEP ID:	-1	[1-8191] (-1 means no Remote MEP)

Loopback and Linktrace Test

Target MAC:		[e.g. 02:10:18:aa:bb:cc]
Linktrace TTL:	-1	[1-255] (-1 means no max hop limit)

Loopback Result:	N/A			
Linktrace Result:	N/A			

b. Modify the fields, using the information provided in the Ethernet Service OAM (802.1ag/Y.1731) section of the table below.

4. Click Apply/Save to commit your changes.
5. To run a loopback test, enter a MAC address in the Target MAC field and click Send Loopback at the bottom of the page. The results appear in the Loopback Result row of the table.
6. To run a linktrace test, enter a MAC address in the Target MAC field and click Send Linktrace at the bottom of the page. The results appear in the Linktrace Result row of the table.

Field Name	Description
Ethernet Link OAM (802.3ah) section	
WAN Interface	Select the WAN interface that you want to test.

Field Name	Description
OAM ID	Enter the ID of this OAM configuration. Only positive numbers are allowed.
Auto Event	Click to enable automatic reporting of events.
Variable Retrieval	Click to enable on-demand link diagnostics, including bit-error-rate approximation.
Link Events	Click to enable reporting of critical conditions that may cause link failure.
Remote Loopback	Click to enable on-demand link diagnostics, including bit-error-rate approximation.
Active Mode	Click to enable this feature.
Ethernet Service OAM (802.1ag/Y.1731) section	
WAN Interface	Select the WAN interface that you want to test.
MD Level	(*Appears for the 802.1ag option only*) Select the domain level for this maintenance domain. Options are **0** - **7**. The larger the domain, the higher the value you should select.
MD Name	(*Appears for the 802.1ag option only*) Enter the name of the maintenance domain, e.g., Broadcom.
MA ID	(*Appears for the 802.1ag option only*) Enter the maintenance association ID, e.g., BRCM.
MEG Level	(*Appears for the Y.1731 option only*) Enter the level of the maintenance entity group.
MEG ID	(*Appears for the Y.1731 option only*) Enter the ID of the MEG.
Local MEP ID	Enter the ID of the local maintenance entity group end point.. Options are **1** - **8191**. The default is **1**.
Local MEP VLAN ID	Enter the VLAN ID of the local MEP. Options are **1** - **4094**. The default is **-1** (no VLAN tag).
CCM Transmission	Click to enable continuity check message transmission.
Remote MEP ID	Enter the ID of the remote MEP. Options are **1** - **8191**. The default is **-1** (no remote MEP).
Loopback and Linktrace Test section	
Target MAC	Enter the MAC address for the test, e.g., 02:10:18:aa:bb:cc.
Linktrace TTL	Enter the maximum number of hops allowed. Optinons are **1**- **233**. The default is **-1** (no limit).
Loopback Result	Displays the results of the loopback test.
Linktrace Result	Displays the results of the linktrace test.

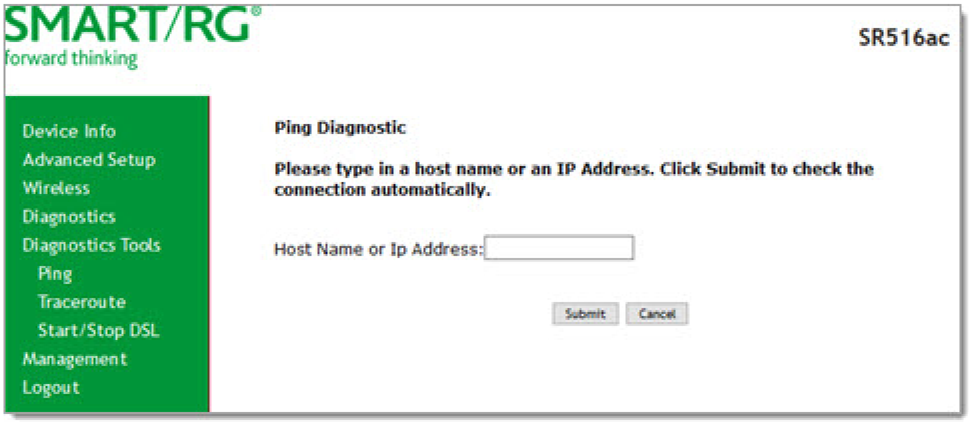
Diagnostic Tools

In this section, you can ping or trace the communication route, and start or stop your DSL connection.

Ping

On this page you can ping a server by host name or IP address.

1. In the left navigation menu, click **Diagnostics Tools** > **Ping**. The following page appears.

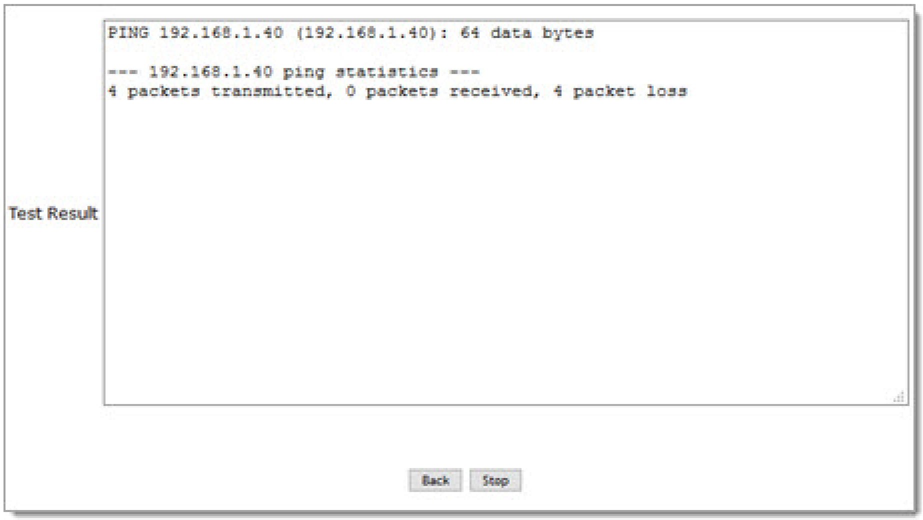


Ping Diagnostic

Please type in a host name or an IP Address. Click Submit to check the connection automatically.

Host Name or Ip Address:

2. Enter the host name or IP address.
3. Click **Submit**. The details of the ping appear on the page.



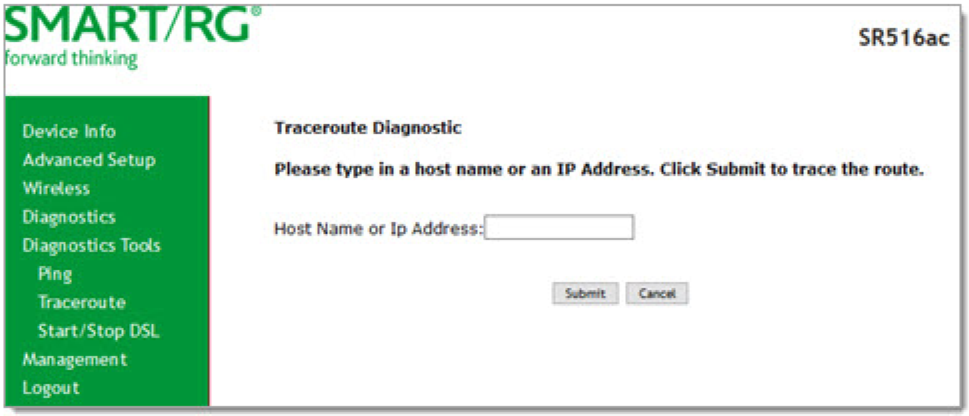
```
PING 192.168.1.40 (192.168.1.40): 64 data bytes

--- 192.168.1.40 ping statistics ---
4 packets transmitted, 0 packets received, 4 packet loss
```

4. To return to the Ping Diagnostic page, click **Back**.
5. To stop a test, click **Stop**.

Traceroute

On this page, you can use the traceroute utility to trace a connection.

1. In the left navigation menu, click **Diagnostics Tools** > **Traceroute**. The following page appears.

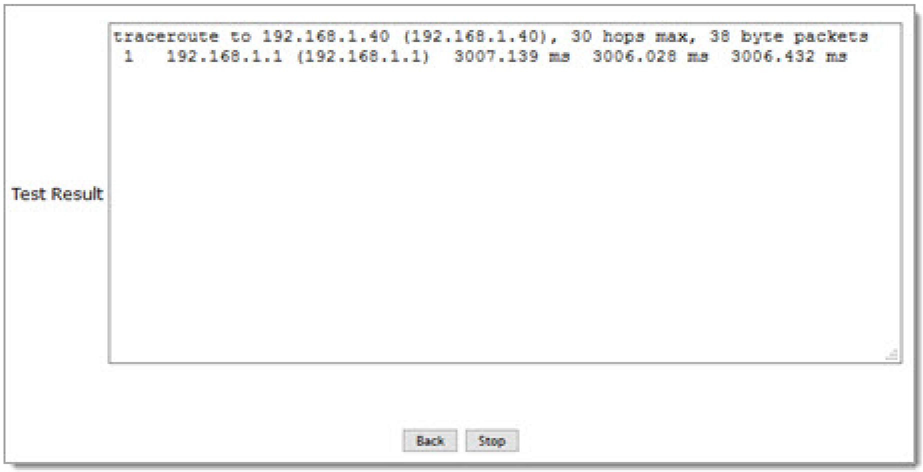


Traceroute Diagnostic

Please type in a host name or an IP Address. Click Submit to trace the route.

Host Name or Ip Address:

2. Enter the host name or IP address.
3. Click **Submit**. The details of the trace appear on the page.



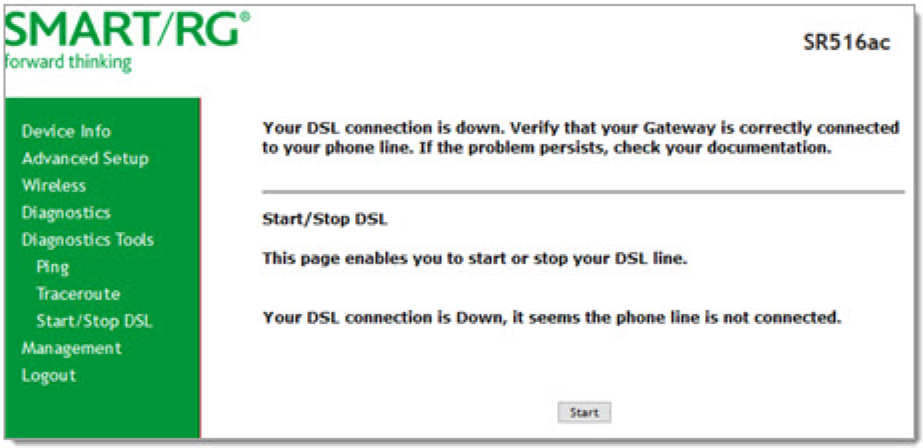
```
traceroute to 192.168.1.40 (192.168.1.40), 30 hops max, 38 byte packets
 1   192.168.1.1 (192.168.1.1)  3007.139 ms  3006.028 ms  3006.432 ms
```

4. To return to the Traceroute Diagnostic page, click **Back**.
5. To stop a test, click **Stop**.

Start / Stop DSL

On this page, you can start or stop your DSL connection.

1. In the left navigation menu, click **Diagnostics Tools** > **Start/Stop DSL**. The following page appears.



Your DSL connection is down. Verify that your Gateway is correctly connected to your phone line. If the problem persists, check your documentation.

Start/Stop DSL

This page enables you to start or stop your DSL line.

Your DSL connection is Down, it seems the phone line is not connected.

2. To connect to your DSL, click **Start**. A message appears, with instructions for refreshing the page. When the connection is ready, the "DSL connection is up" message appears.
3. To stop your connection, click **Stop**. A message appears, stating that your DSL connection is down.

Management

In this section, you can configure server and system log settings, control access, and configure clients.

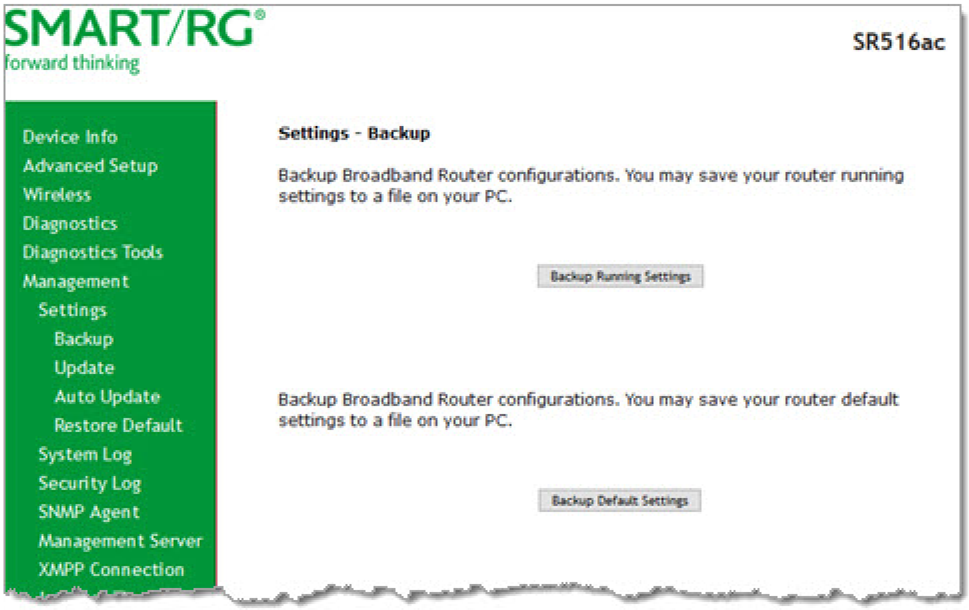
Settings

In this section, you can back up the current settings, restore saved settings, or reset the gateway to default settings.

Backup

On this page, you can back up the current settings for your gateway in a file stored on your computer.

1. In the left navigation bar, click Management > Settings. The following page appears.



Settings - Backup

Backup Broadband Router configurations. You may save your router running settings to a file on your PC.

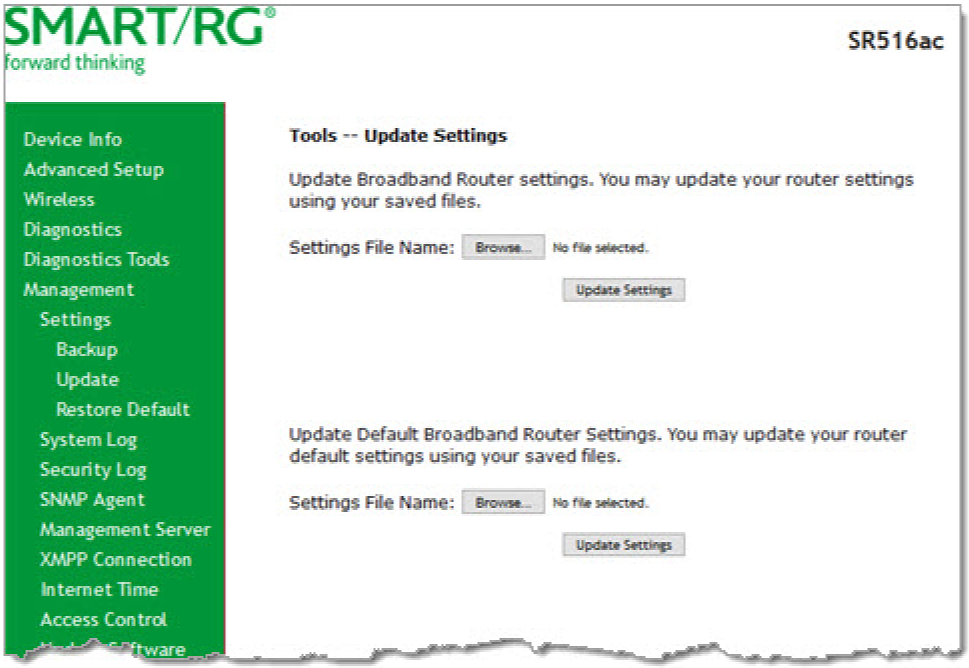
Backup Broadband Router configurations. You may save your router default settings to a file on your PC.

2. To back up the current *running* settings:
   a. Click Backup Running Settings. The Opening file dialog box appears.
   b. Click OK. The file is saved to your default download location and is named "backupsettings.conf".
3. To back up the current *default* settings:
   a. Click Backup Default Settings. The Opening file dialog box appears.
   b. Click OK. The file is saved to your default download location and is named "backupdefaultsettings.conf".

Update

On this page, you can restore previously backed-up gateway settings.

1. In the left navigation bar, click Management > Settings > Update. The following page appears.



Tools -- Update Settings

Update Broadband Router settings. You may update your router settings using your saved files.

Settings File Name: Browse... No file selected.

Update Settings

Update Default Broadband Router Settings. You may update your router default settings using your saved files.

Settings File Name: Browse... No file selected.

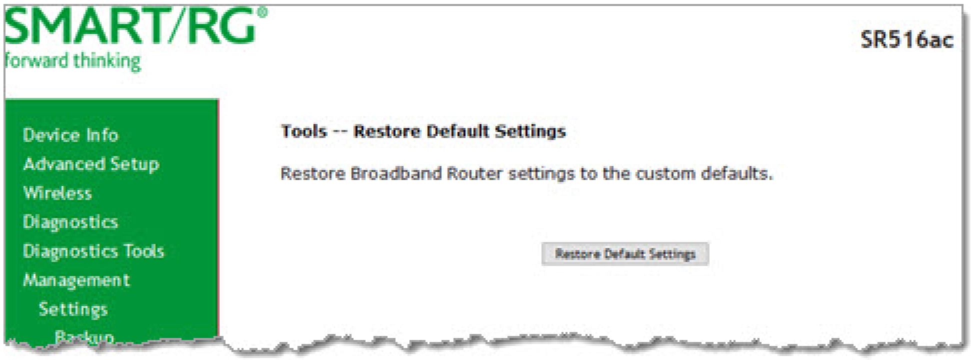
Update Settings

2. To update settings from a file that you saved previously:
   a. Click the Browse button to locate either a customized setting file or the default setting file (.conf file) on your local system and click Open.
   b. Click Update Settings. The gateway reboots when the update has completed.

Restore Default

On this page, you can restore the gateway to the factory default settings. If you think you might need to reload the current settings, create a backup (on the Management > Settings > Backup page) before proceeding.

1. In the left navigation menu, click Management > Settings > Restore Default. The following page appears.



Tools -- Restore Default Settings

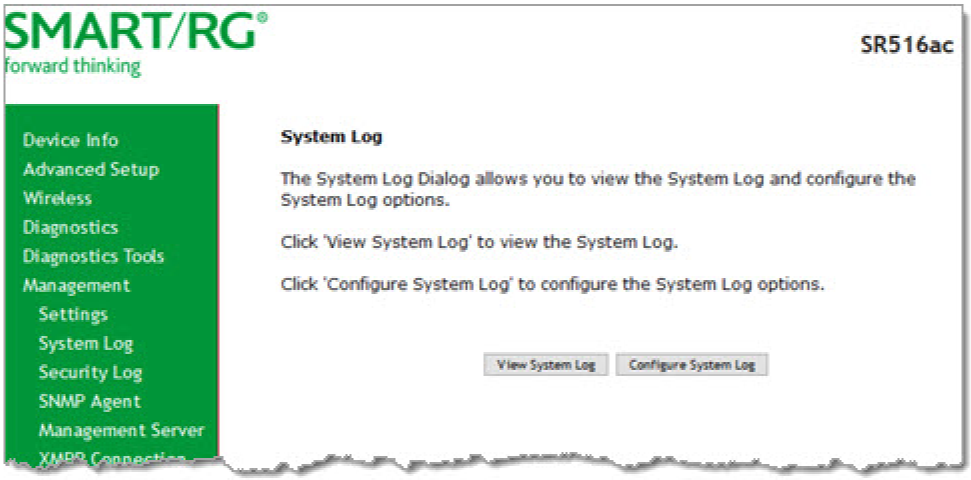
Restore Broadband Router settings to the custom defaults.

2. Click Restore Default Settings. The system returns to the default settings and reboots.

System Log

The System Log page displays a history of error conditions and other events encountered by your gateway. You can configure the system log and view the security log.

1. In the left navigation bar, click **Management** > **Settings** > **System Log**. The following page appears.



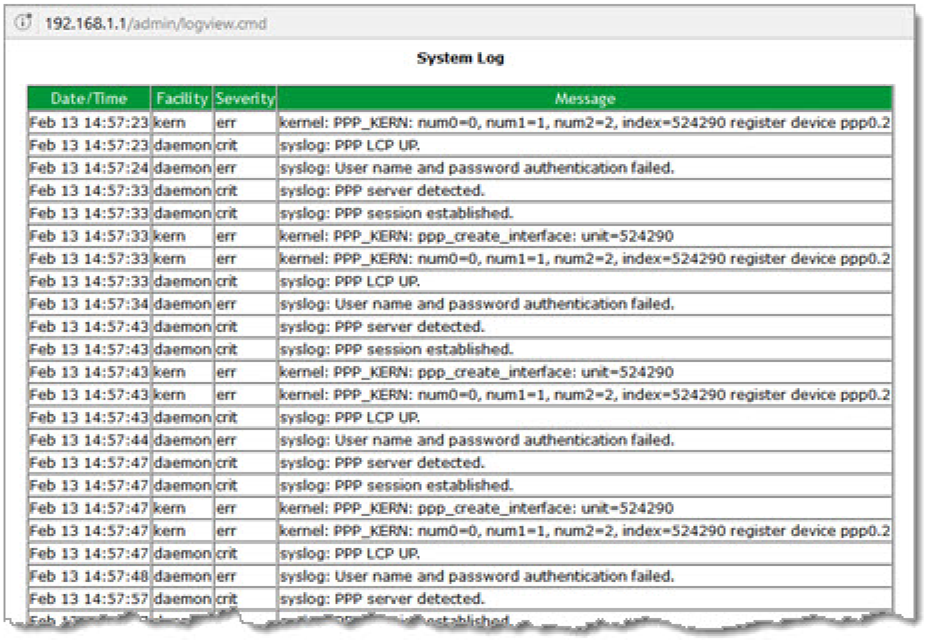
System Log

The System Log Dialog allows you to view the System Log and configure the System Log options.

Click 'View System Log' to view the System Log.

Click 'Configure System Log' to configure the System Log options.

2. To view the system log details:
   a. Click **View System Log**. The log appears in a separate window.

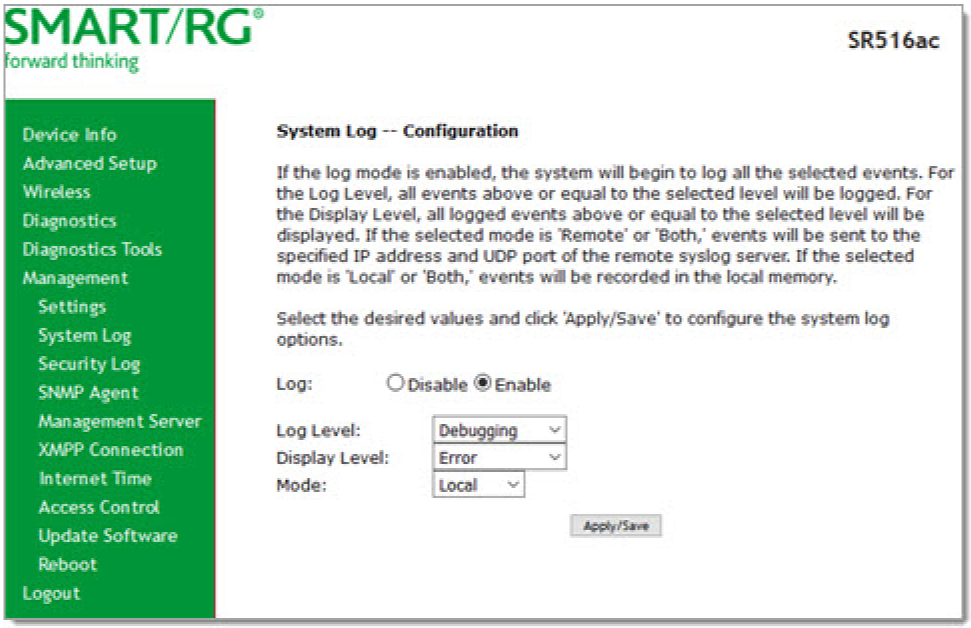


System Log

Date/Time	Facility	Severity	Message
Feb 13 14:57:23	kern	err	kernel: PPP_KERN: num0=0, num1=1, num2=2, index=524290 register device ppp0.2
Feb 13 14:57:23	daemon	crit	syslog: PPP LCP UP.
Feb 13 14:57:24	daemon	err	syslog: User name and password authentication failed.
Feb 13 14:57:33	daemon	crit	syslog: PPP server detected.
Feb 13 14:57:33	daemon	crit	syslog: PPP session established.
Feb 13 14:57:33	kern	err	kernel: PPP_KERN: ppp_create_interface: unit=524290
Feb 13 14:57:33	kern	err	kernel: PPP_KERN: num0=0, num1=1, num2=2, index=524290 register device ppp0.2
Feb 13 14:57:33	daemon	crit	syslog: PPP LCP UP.
Feb 13 14:57:34	daemon	err	syslog: User name and password authentication failed.
Feb 13 14:57:43	daemon	crit	syslog: PPP server detected.
Feb 13 14:57:43	daemon	crit	syslog: PPP session established.
Feb 13 14:57:43	kern	err	kernel: PPP_KERN: ppp_create_interface: unit=524290
Feb 13 14:57:43	kern	err	kernel: PPP_KERN: num0=0, num1=1, num2=2, index=524290 register device ppp0.2
Feb 13 14:57:43	daemon	crit	syslog: PPP LCP UP.
Feb 13 14:57:44	daemon	err	syslog: User name and password authentication failed.
Feb 13 14:57:47	daemon	crit	syslog: PPP server detected.
Feb 13 14:57:47	daemon	crit	syslog: PPP session established.
Feb 13 14:57:47	kern	err	kernel: PPP_KERN: ppp_create_interface: unit=524290
Feb 13 14:57:47	kern	err	kernel: PPP_KERN: num0=0, num1=1, num2=2, index=524290 register device ppp0.2
Feb 13 14:57:47	daemon	crit	syslog: PPP LCP UP.
Feb 13 14:57:48	daemon	err	syslog: User name and password authentication failed.
Feb 13 14:57:57	daemon	crit	syslog: PPP server detected.
Feb			established.

   b. To update the data, click **Refresh**.

3. To configure the log settings:
   a. Click **Configure System Log**. The following page appears.



System Log -- Configuration

If the log mode is enabled, the system will begin to log all the selected events. For the Log Level, all events above or equal to the selected level will be logged. For the Display Level, all logged events above or equal to the selected level will be displayed. If the selected mode is 'Remote' or 'Both,' events will be sent to the specified IP address and UDP port of the remote syslog server. If the selected mode is 'Local' or 'Both,' events will be recorded in the local memory.

Select the desired values and click 'Apply/Save' to configure the system log options.

Log: ○ Disable ● Enable

Log Level: Debugging

Display Level: Error

Mode: Local

   b. Modify the fields as needed, using the information in the table below.
   c. Click **Apply/Save** to save and apply your changes. You are returned to the System Log page.

The fields on this page are defined below.

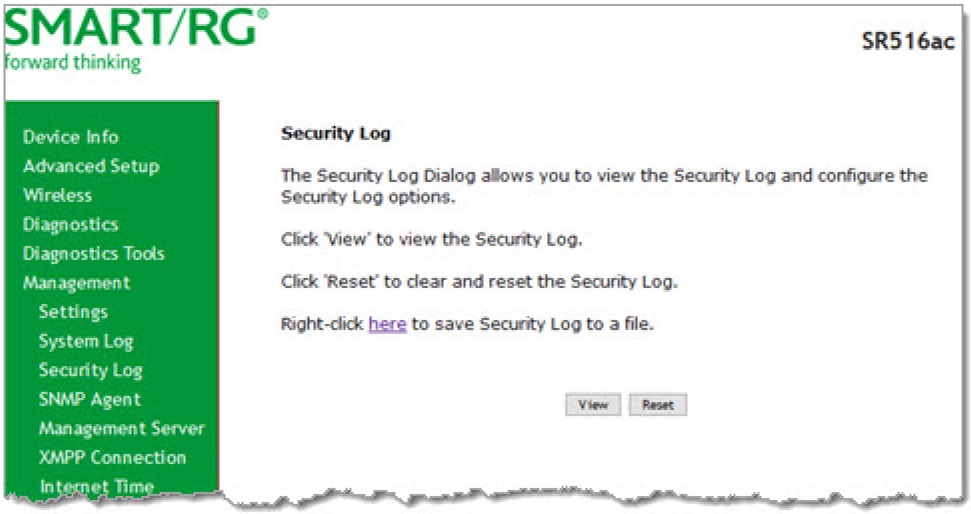
Action	Description
Log Level	Select the type of information that you want logged. Options are **Emergency**, **Alert**, **Critical**, **Error**, **Warning**, **Notice**, **Informational**, and **Debugging**. The options are listed in order from least detailed to most detailed. The default is **Debugging**.
Display Level	Select the level of information that should be displayed. Options are **Emergency**, **Alert**, **Critical**, **Error**, **Notice**, **Warning**, **Informational**, and **Debugging**. The options are listed in order from least detailed to most detailed. The default is **Error**. This level is recommended (least verbose) unless you are actively troubleshooting a situation with a subscriber for which increased detail is required.
Mode	Select where log events will be sent. Options are **Local**, **Remote**, and **Both**. Select **Remote** or **Both** to send to the specified IP address and UDP port of a remote syslog server. Select **Local** or **Both** to record events in the local memory of your gateway. The default is **Local**. When you select **Remote** or **Both**, additional fields appear. Enter the IP address and port number for the remote syslog server.

Security Log

The security log contains a history of events related to sensitive access to the gateway. Logged events include:

- Password change success / failure
- Authorized login success / failure
- Authorized user logged out
- Security lockout added / removed
- Authorized / unauthorized resource access
- Software update

1. In the left navigation bar, click **Management** > **Security Log**. The following page appears.



Security Log

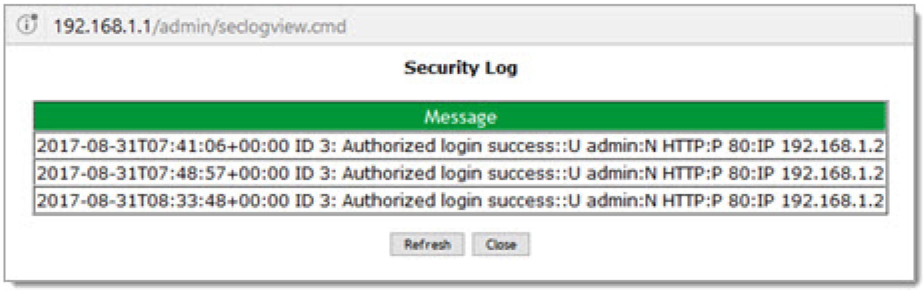
The Security Log Dialog allows you to view the Security Log and configure the Security Log options.

Click 'View' to view the Security Log.

Click 'Reset' to clear and reset the Security Log.

Right-click here to save Security Log to a file.

2. Do any of the following:
   - To view the log, click **View**. The log appears in a separate window.



Security Log

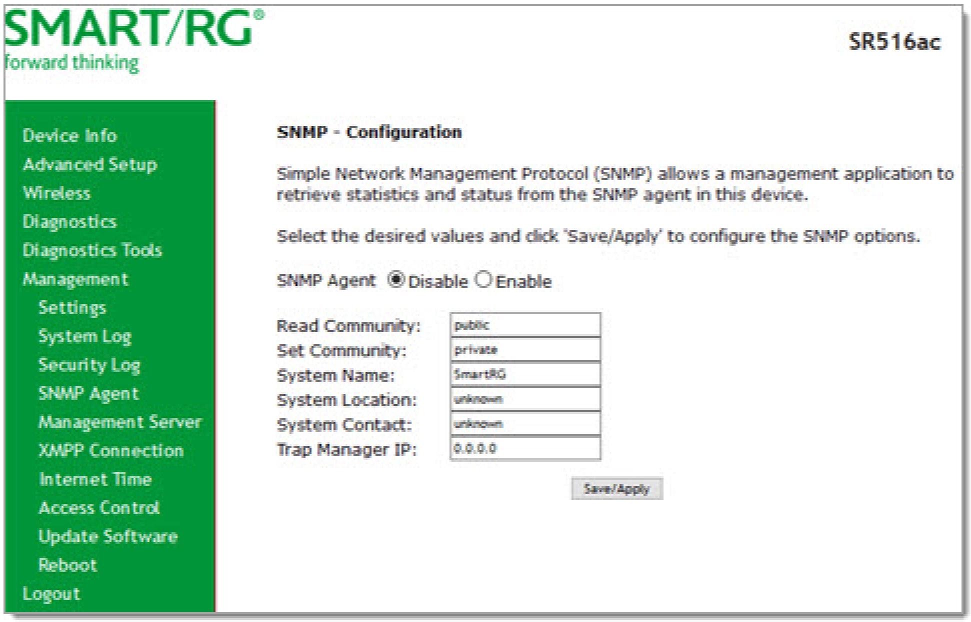
Message
2017-08-31T07:41:06+00:00 ID 3: Authorized login success::U admin:N HTTP:P 80:IP 192.168.1.2
2017-08-31T07:48:57+00:00 ID 3: Authorized login success::U admin:N HTTP:P 80:IP 192.168.1.2
2017-08-31T08:33:48+00:00 ID 3: Authorized login success::U admin:N HTTP:P 80:IP 192.168.1.2

   - To purge the log entries and start fresh, click **Reset**. A confirming message appears. Click **Close**.
   - To export the log to a local drive, right-click the **here** link in the last line of the instructions on the page. The log appears in the browser window. You can save the page or select all of the log text, paste into a text file and save the file.

SNMP Agent

On this page, you can configure the SNMP (Simple Network Management Protocol) settings to retrieve statistics from the SNMP agent for the gateway. You can enable or disable the SNMP agent and set parameters such as the read community, system name and trap manager IP.

1. In the left navigation bar, click Management > SNMP Agent. The following page appears.



SNMP - Configuration

Simple Network Management Protocol (SNMP) allows a management application to retrieve statistics and status from the SNMP agent in this device.

Select the desired values and click 'Save/Apply' to configure the SNMP options.

SNMP Agent ● Disable ○ Enable

Read Community:	public
Set Community:	private
System Name:	SmartRG
System Location:	unknown
System Contact:	unknown
Trap Manager IP:	0.0.0.0

2. Modify the fields as needed, using the information provided in the table below.
3. Click Save/Apply to commit your changes.

The fields on this page are defined below.

Field Name	Description
SNMP Agent	This option is disabled by default. Click **Enable** to enable the SNMP agent.
Read Community	Select whether access to the network community is restricted. Options are **public** and **private**. The default is **public**.
Set Community	Select whether access to the write (set) community is restricted. Options are **public** and **private**. The default is **private**.
System Name	Enter the name of the system.
System Location	(*Optional*) Enter the location of the system.
System Contact	(*Optional*) Enter the contact for the system.
Trap Manager IP	(*Optional*) Enter the IP address where the trap manager is installed.

Management Server

SmartRG gateways support TR-069 based standards for remote management, including STUN server configuration. In this section, you can configure the gateway with details about the management ACS (Auto Configuration Server) to which this gateway will be linked.

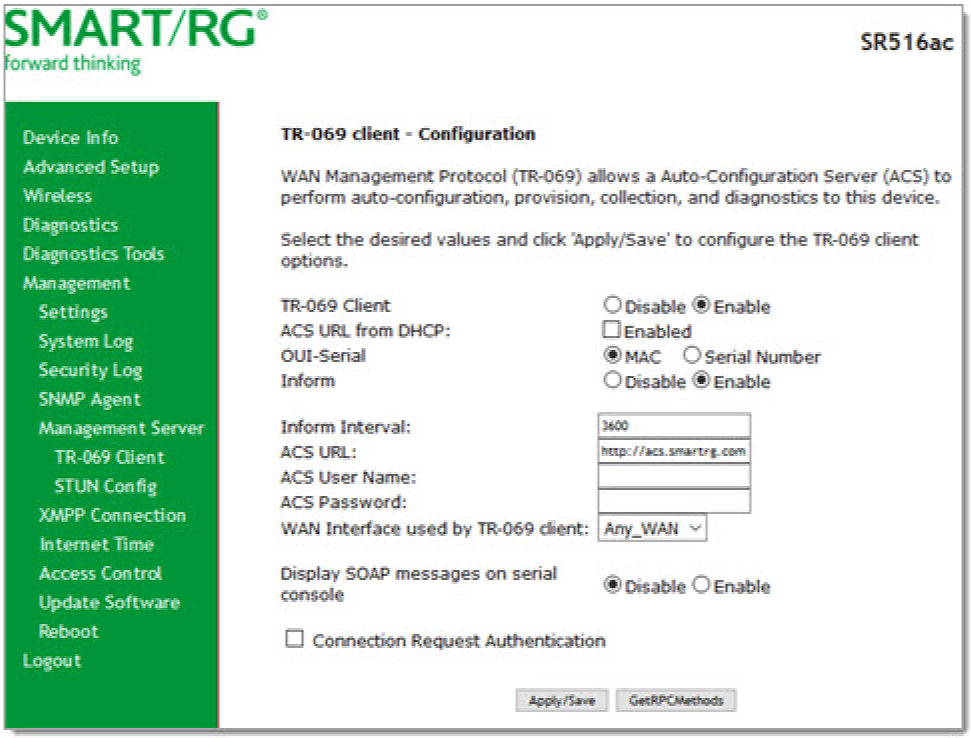
TR-069

The TR-069 client screen contains default connection parameters and generally only needs to be enabled, pointed to the ACS URL, and any required ACS Username and ACS Password entered. This manual does not cover the setup of your ACS. If you need to modify the default settings, consult the materials provided by your ACS vendor to determine the appropriate parameters and server settings.

SmartRG products can accommodate several ACS products, including:

- Calix Consumer ACS
- Cisco Prime Home
- ClearVision
- Device Manager by SmartRG

1. In the left navigation bar, click Management > Management Server. The following page appears.



TR-069 client - Configuration

WAN Management Protocol (TR-069) allows a Auto-Configuration Server (ACS) to perform auto-configuration, provision, collection, and diagnostics to this device.

Select the desired values and click 'Apply/Save' to configure the TR-069 client options.

TR-069 Client	○ Disable ● Enable
ACS URL from DHCP:	□ Enabled
OUI-Serial	● MAC ○ Serial Number
Inform	○ Disable ● Enable
Inform Interval:	3600
ACS URL:	http://acs.smartrg.com
ACS User Name:	
ACS Password:	
WAN Interface used by TR-069 client:	Any_WAN
Display SOAP messages on serial console	● Disable ○ Enable

□ Connection Request Authentication

2. Complete the necessary fields per the instructions from your ACS platform vendor.

Field Name	Description
TR-069 Client	This option is enabled by default. To *disable* this feature, click the **Disable** button.
ACS URL from DHCP	Click to enable the gateway to obtain the ACS URL from the DHCP server.
OUI-Serial	Select whether to use the MAC address or the device serial number as the identifier. The default is **MAC**.
Inform	Select whether the gateway will synchronize with the ACS. This option is enabled by default.

Field Name	Description
	To *disable* this feature, click the **Disable** button.
Inform Interval	Enter the frequency (in seconds) at which the CPE (gateway) checks in with the ACS to sync and exchange data. A typical production environment has CPEs informing to the ACS once a day or every 86,400 seconds. The default is **3600** seconds (1 hour).
ACS URL	Enter the URL for the CPE to connect to the ACS using the CPE WAN Management Protocol. This parameter MUST be in the form of a valid HTTP or HTTPS URL. An HTTPS URL indicates that the ACS supports SSL. The "host" portion of this URL is used by the CPE for validating the certificate from the ACS when using certificate-based authentication. You can include a port specification suffix if your ACS platform requires it, e.g., http://-customer1.acs.smartrg.com:30005 where 30005 is the port number. The default port is **30005**.
ACS User Name	Enter the user name by which this gateway logs in to the ACS. This is usually "admin".
ACS Password	Enter the password to authenticate the above user name. This is usually "admin".
WAN Interface used by TR-069 client	Select **any_WAN**, **LAN**, **Loopback** or any configured connection to identify how this gateway will connect to the ACS.
Display SOAP messages on serial console	Select whether to enable the display of messages on consoles. The default is **Disable**.

3. (*Optional*) To configure the modem client Connection Request mechanism used by your ACS for communication with subscriber gateways, click **Connection Request Authentication**. Additional fields appear.
Note: Consult with your ACS vendor for any specific connection request requirement impacted by the following settings.

Field Name	Description
Connection Request Username	Enter the user name by which this gateway authenticates the ACS. For example, many ACS platforms use “admin” or “tr069”.
Connection Request Password	Enter the password by which this gateway will authenticate to the ACS.
Connection Request Port	(*Optional*) Enter the port number, e.g., "http://xxx.xxx.xxx.xxx:30005/" where the xxx values are specific WAN IP octet numbers. The default port value is **30005**.
Connection Request URL	This URL is set automatically and cannot be changed. It includes the request port number, e.g., http://10.101.40.115:30005/.

4. To force the gateway to attempt to sync with the ACS, click the **GetRPCMethods** button. This will assist you in verifying the TR-069 parameters entered above.
5. Click **Apply/Save** to commit your changes.

STUN Config

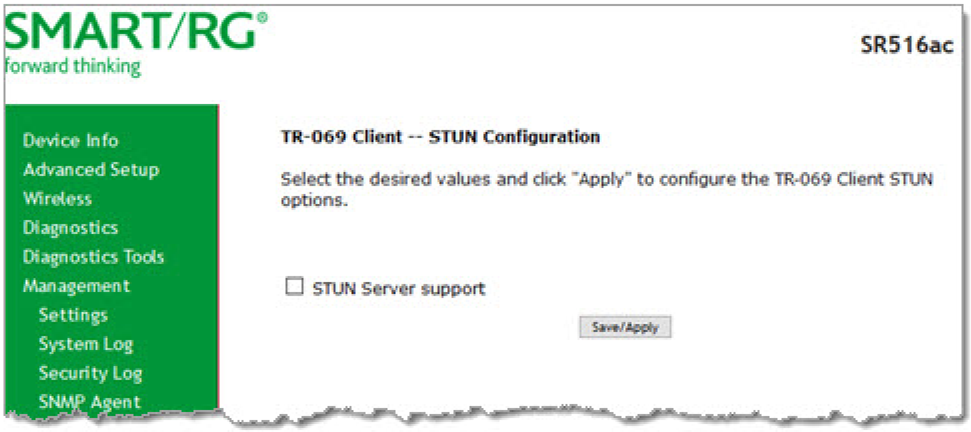
STUN stands for “Simple Traversal of UDP through NATs”. STUN enables a device to find out its public IP address and the type of NAT service it is sitting behind.

STUN is most commonly used with older modems under ACS management connected via a NAT gateway. NAT accommodates a LAN-side device that has been allocated a Private IP address such as a CPE device on a private network behind an ONT. In this instance, the regular CWMP Connection Request mechanism to talk to the modem gateway cannot be used to initiate a session with that ACS.

A STUN server receives STUN requests and sends STUN responses. STUN servers are generally attached to the public Internet.

On this page, when a STUN server is present within the infrastructure of the Service Provider, you can configure this gateway with the connectivity specifics for that server.

1. In the left navigation bar, click Management > Management Server > STUN Config. The following page appears.

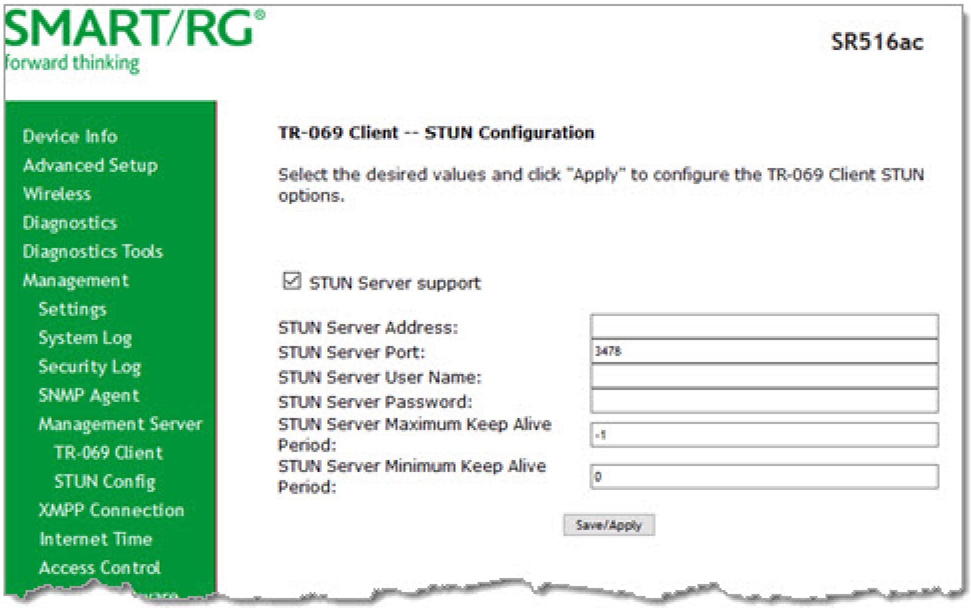


TR-069 Client -- STUN Configuration

Select the desired values and click "Apply" to configure the TR-069 Client STUN options.

□ STUN Server support

2. To view the required STUN settings, click STUN Server Support. Additional fields appear.



TR-069 Client -- STUN Configuration

Select the desired values and click "Apply" to configure the TR-069 Client STUN options.

☑ STUN Server support

STUN Server Address:	
STUN Server Port:	3478
STUN Server User Name:	
STUN Server Password:	
STUN Server Maximum Keep Alive Period:	-1
STUN Server Minimum Keep Alive Period:	0

3. Modify the fields using the information provided in the following table.
4. Click Save/Apply to commit your changes.

The fields on this page are defined below.

Field Name	Description
STUN Server Address	Enter the physical STUN server's assigned network address. An invalid address will produce an immediate on-page error message from the gateway. You can enter a maximum of 256 characters An ACS server may also have STUN functionality running on the same physical box. Consult your ACS vendor for implementation options and also TR-069 protocol documentation, if necessary.
STUN Server Port	Enter the port number associated with your STUN server infrastructure. Options are **0** - **64435**. The default is **3478**.
STUN Server User Name	Enter the username by which the gateway accesses the STUN infrastructure. Maximum length is 256 characters. Special characters are accepted.
STUN Server Password	Enter the password by which the modem authenticates the above username to the STUN infrastructure. Maximum length is 256 characters. Special characters are accepted. The value will be hidden.
STUN Server Maximum Keep Alive Period *	Enter the maximum time(in seconds) that the keepalive function should be active. Options are **0**-Unlimited. The default is **-1** (no maximum limit).
STUN Server Minimum Keep Alive Period *	Enter the minimum time(in seconds) that the keepalive function should be active. Options are **0**-Unlimited. The default is **0** seconds.

* This mechanism is used for refreshing NAT bindings with using Restricted Cone NAT or Port Restricted Cone NAT. A device's internal address / port mappings (which the STUN protocol can use) can have keep alive values attributed. These minimum and maximum keep alive times define the minimum time to retain the mapping information that STUN has discovered, and the maximum time to retain that information, before refreshing it through forced re-discovery.

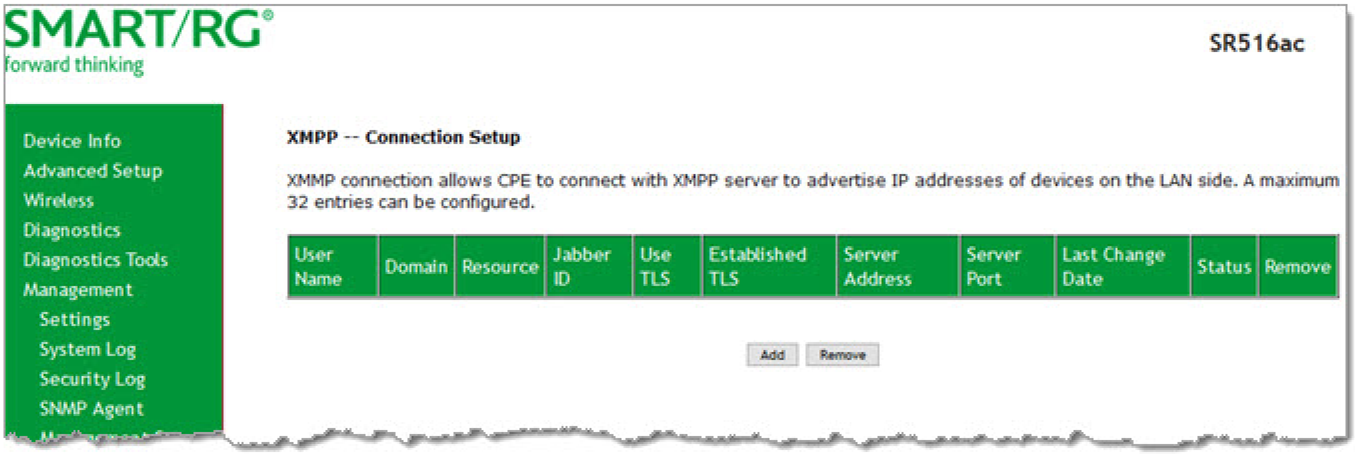
With these NAT schemes, the initial network address translation may not be used after a specified elapsed time. Internal mapping is dropped. The gateway then assigns a different address mapping. This mechanism allows for coordinated refresh on the bindings for mappings used by the STUN protocol. For further information, review STUN-related RFCs.

Selecting appropriate values for these two fields is influenced by a various environmental factors including device types deployed, services employed and NAT configuration options enabled within the topology.

XMPP Connection

On this page, you can configure a connection between the gateway and an XMPP server.

1. In the left navigation bar, click Management > XMPP Connection. The following page appears.

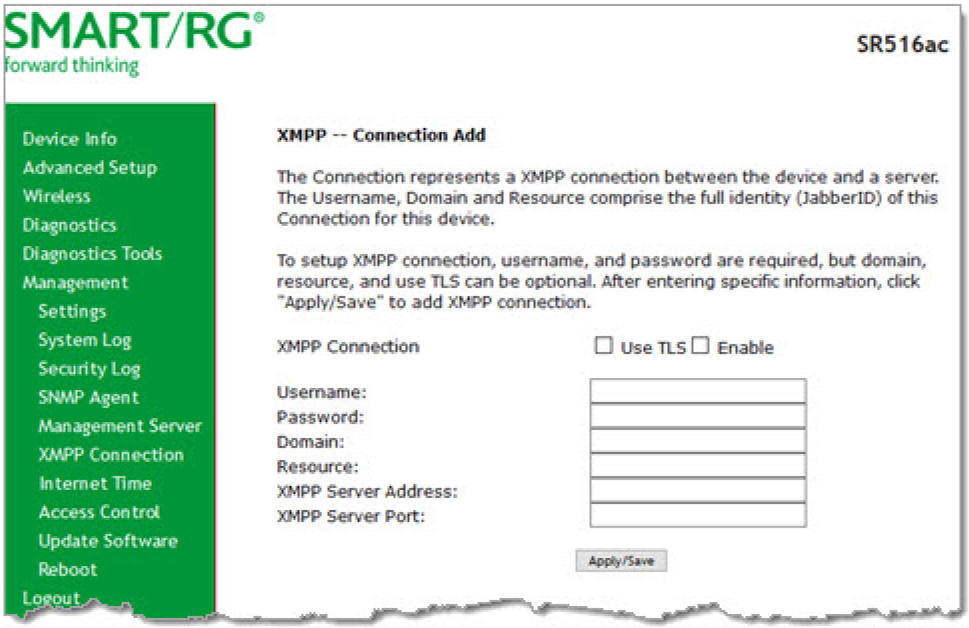


XMPP -- Connection Setup

XMMP connection allows CPE to connect with XMPP server to advertise IP addresses of devices on the LAN side. A maximum 32 entries can be configured.

User Name	Domain	Resource	Jabber ID	Use TLS	Established TLS	Server Address	Server Port	Last Change Date	Status	Remove

2. To add a connection, click Add. The following page appears.



XMPP -- Connection Add

The Connection represents a XMPP connection between the device and a server. The Username, Domain and Resource comprise the full identity (JabberID) of this Connection for this device.

To setup XMPP connection, username, and password are required, but domain, resource, and use TLS can be optional. After entering specific information, click "Apply/Save" to add XMPP connection.

XMPP Connection ☐ Use TLS ☐ Enable

Username:
Password:
Domain:
Resource:
XMPP Server Address:
XMPP Server Port:

3. In the XMPP Connection field, select whether to use TLS and then click Enable.
4. Modify the fields as needed, using the information provided in the table below.

Field	Description
Username	Enter the username for accessing the XMPP server.
Password	Enter the password for accessing the XMPP server.

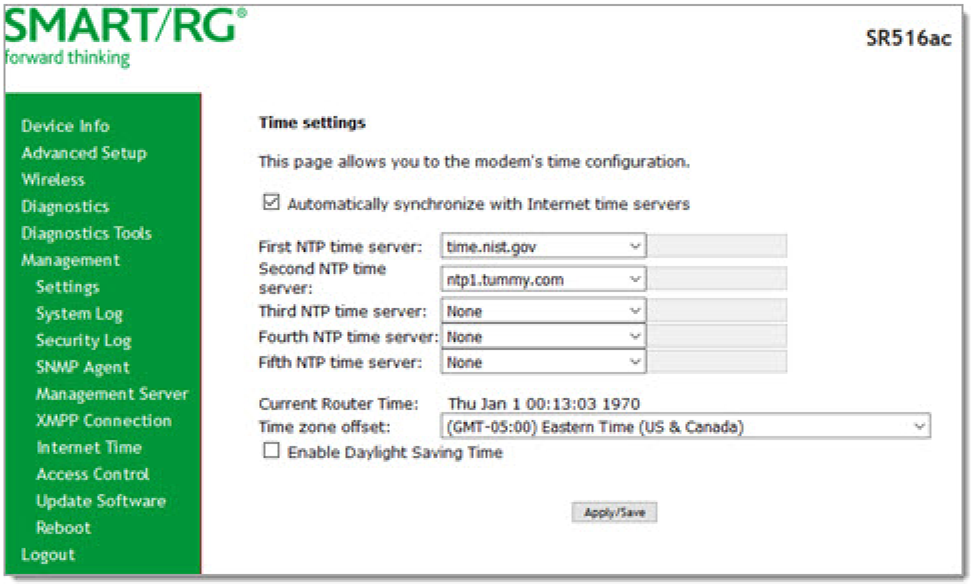
Field	Description
Domain	(*Optional*) Enter the domain for this connection.
Resource	(*Optional*) Enter a descriptive name for this connection.
XMPP Server Address	Enter the IP address for the server.
XMPP Server Port	Enter the port for the IP address entered above.

5. Click **Apply/Save** to save and apply the settings.
6. To remove a connection, click the **Remove** checkbox to the right of the entry and then click the **Remove** button.

Internet Time

On this page, you can configure the gateway to synchronize its time with the Internet time servers. This feature is enabled by default.

1. In the left navigation bar, click **Management** > **Internet Time**. The following page appears.



Time settings

This page allows you to the modem's time configuration.

☑ Automatically synchronize with Internet time servers

First NTP time server: time.nist.gov
Second NTP time server: ntp1.tummy.com
Third NTP time server: None
Fourth NTP time server: None
Fifth NTP time server: None

Current Router Time: Thu Jan 1 00:13:03 1970
Time zone offset: (GMT-05:00) Eastern Time (US & Canada)
☐ Enable Daylight Saving Time

2. Select the desired time servers.
3. Select the **Time zone offset**.
4. (*Optional*) Click **Enable Daylight Savings Time**.
5. Click **Apply/Save** to save and apply the settings.
6. To *disable* this feature, click the **Automatically synchronize with Internet time servers** check box to clear it and then click **Apply/Save** to save your changes.

Access Control

In this section, you can manage user passwords and the services that are available for users.

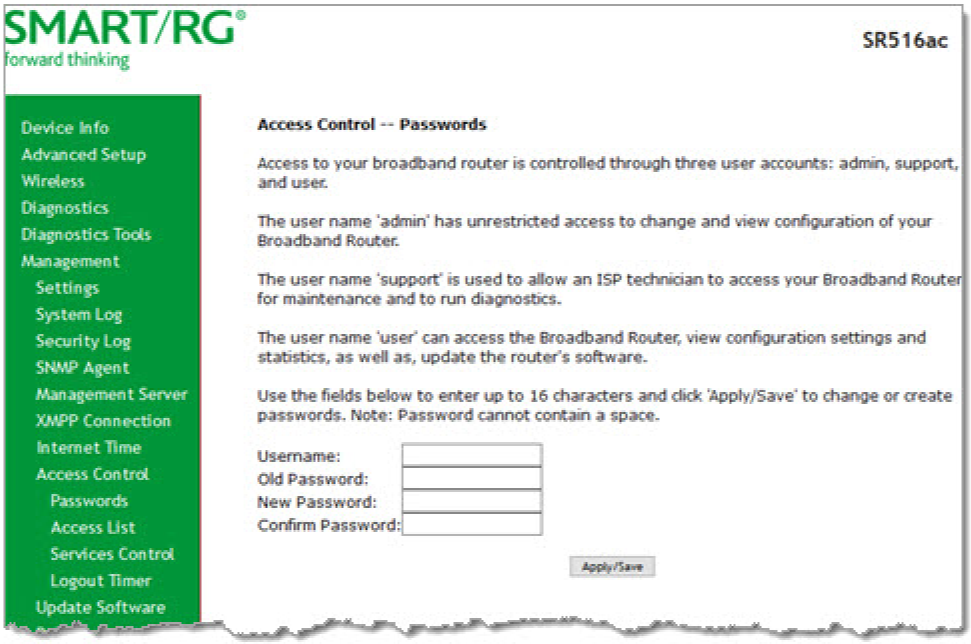
The following user names are assigned specific rights:

- "admin" has unrestricted access
- "support" has general access rights plus additional rights to perform maintenance tasks and run diagnostics.
- "user" can view settings and statistics and update the firmware.

Passwords

On this page, you can modify the username and password of your users.

1. In the left navigation bar, click Management > Access Control. The following page appears.



Access Control -- Passwords

Access to your broadband router is controlled through three user accounts: admin, support, and user.

The user name 'admin' has unrestricted access to change and view configuration of your Broadband Router.

The user name 'support' is used to allow an ISP technician to access your Broadband Router for maintenance and to run diagnostics.

The user name 'user' can access the Broadband Router, view configuration settings and statistics, as well as, update the router's software.

Use the fields below to enter up to 16 characters and click 'Apply/Save' to change or create passwords. Note: Password cannot contain a space.

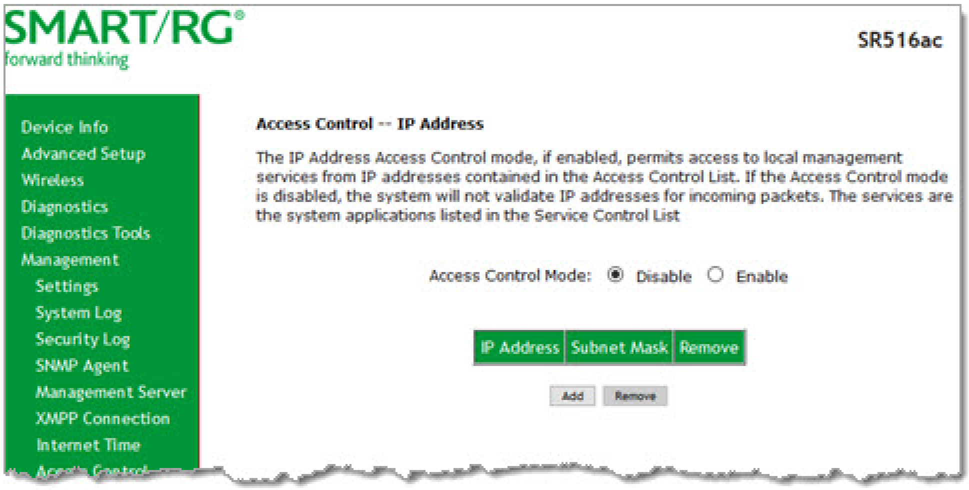
Username:
Old Password:
New Password:
Confirm Password:

2. Enter the user name in the Username field.
3. Enter the current password in the Old Password field.
4. Enter the new password in the New Password and Confirm Password fields. Passwords cannot contain spaces.
5. Click Apply/Save to implement your changes.

Access List

On this page, you can create list of IP addresses that are allowed to access local management services (defined in the Services Control list). When Access Control mode is disabled, IP addresses for incoming packets are not validated.

1. In the left navigation bar, click **Management** > **Access Control** > **Access List**. The following page appears.



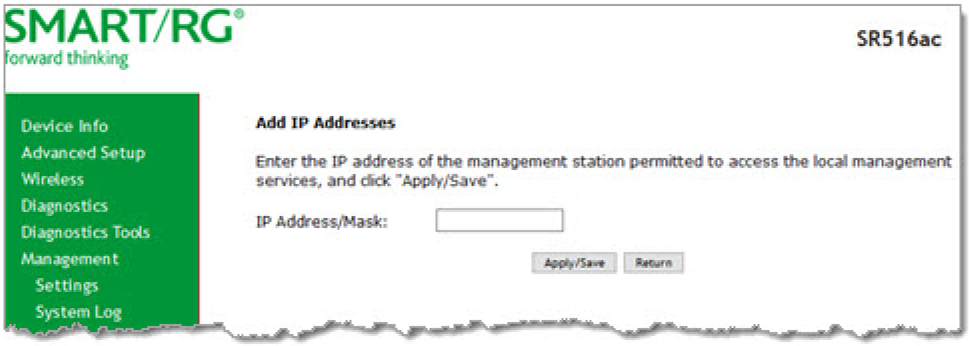
Access Control -- IP Address

The IP Address Access Control mode, if enabled, permits access to local management services from IP addresses contained in the Access Control List. If the Access Control mode is disabled, the system will not validate IP addresses for incoming packets. The services are the system applications listed in the Service Control List

Access Control Mode: ● Disable ○ Enable

IP Address	Subnet Mask	Remove

2. Click **Add**. The following page appears.



Add IP Addresses

Enter the IP address of the management station permitted to access the local management services, and click "Apply/Save".

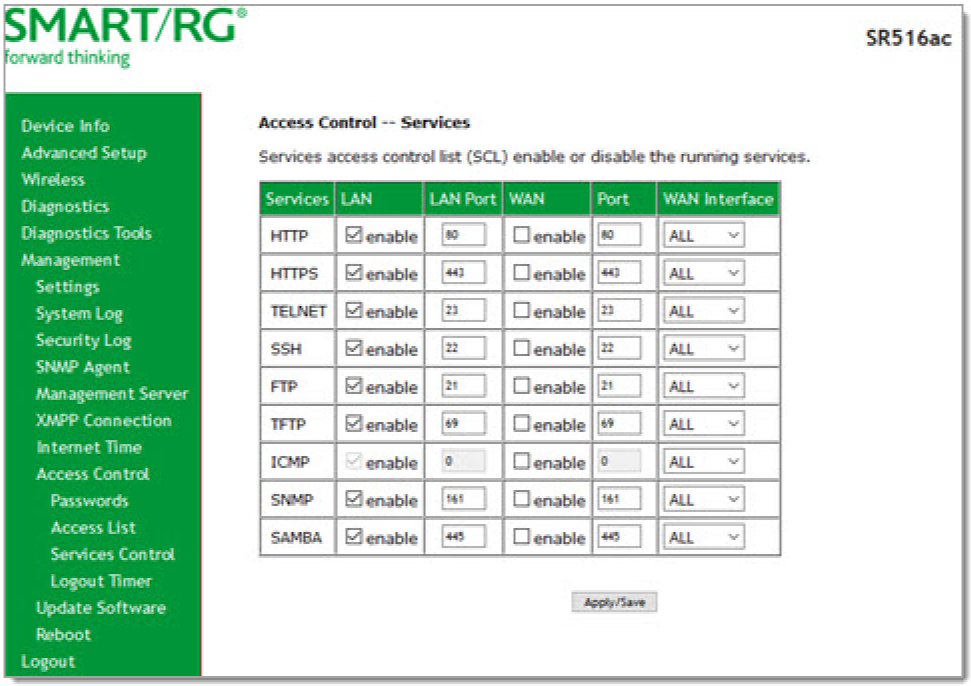
IP Address/Mask:

3. Enter the IP address and mask of the station allowed to access local management services.
4. To enable the listed IP addresses to access local management services, in the **Access Control Mode** field, click **Enable**.
5. To remove a connection, click the **Remove** checkbox to the right of the entry and then click the **Remove** button. If you remove the only entry, **Access Control Mode** is set to **Disable**.
6. Click **Apply/Save** to save and apply the settings.

Services Control

On this page, you can enable or disable the different types of services that your gateway can access.

1. In the left navigation bar, click Management > Access Control > Services Control. The following page appears.



Access Control -- Services

Services access control list (SCL) enable or disable the running services.

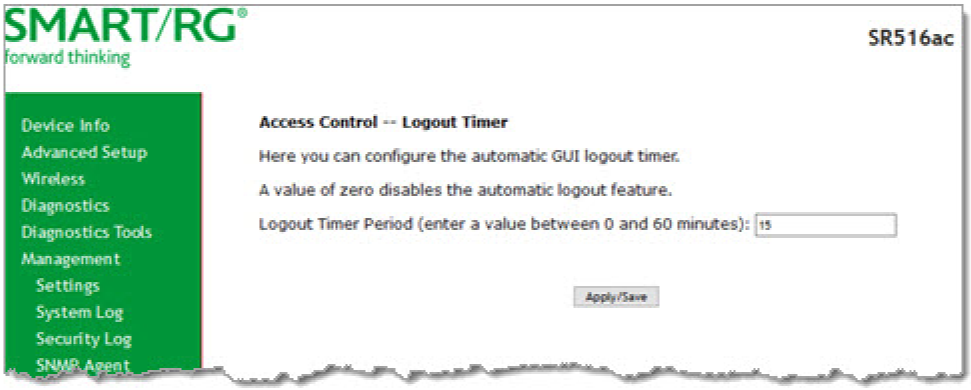
Services	LAN	LAN Port	WAN	Port	WAN Interface
HTTP	☑ enable	80	□ enable	80	ALL
HTTPS	☑ enable	443	□ enable	443	ALL
TELNET	☑ enable	23	□ enable	23	ALL
SSH	☑ enable	22	□ enable	22	ALL
FTP	☑ enable	21	□ enable	21	ALL
TFTP	☑ enable	69	□ enable	69	ALL
ICMP	☑ enable	0	□ enable	0	ALL
SNMP	☑ enable	161	□ enable	161	ALL
SAMBA	☑ enable	445	□ enable	445	ALL

2. Select or clear the enable checkbox next to each service and interface that you want to change.
3. (*Optional*) In the LAN Port and Port fields, modify the port numbers for the services.
4. (*Optional*) In the WAN Interface field, select an interface. The default is **ALL** and works best for most environments.
5. Click Apply/Save to save and apply the settings.

Logout Timer

On this page, you can define the maximum time that a session can remain open before the gateway logs out.

1. In the left navigation bar, click Management > Access Control > Logout Timer. The following page appears.



Access Control -- Logout Timer

Here you can configure the automatic GUI logout timer.

A value of zero disables the automatic logout feature.

Logout Timer Period (enter a value between 0 and 60 minutes): 15

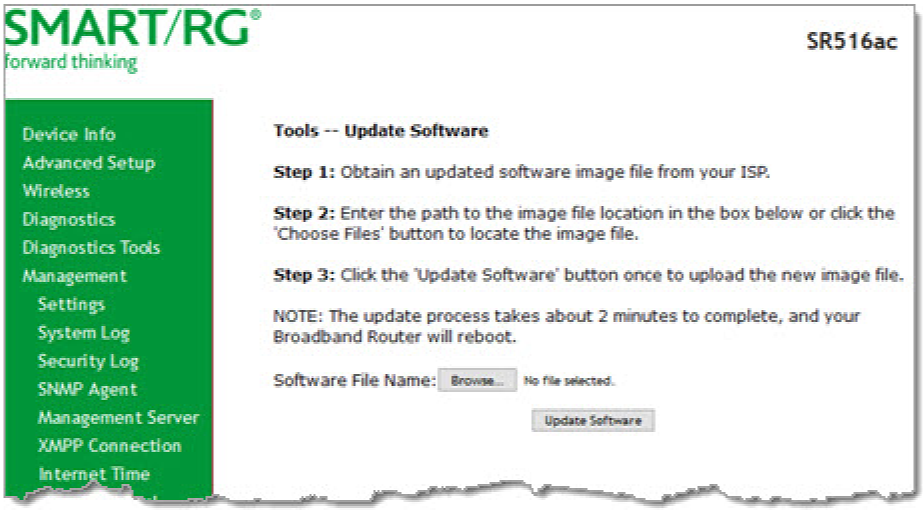
2. In the **Logout Timer Period** field, type the number of minutes after which a session will be ended. Options are **0** - **60** minutes. The default is **15** minutes. To disable this feature, enter a zero (**0**) in the field.

Update Software

On this page, you can update the firmware of your gateway. Software updates for SmartRG product are available for download by direct customers of SmartRG via the SmartRG Customer Portal.

Note: Make sure that you have downloaded the correct software file as instructed by your ISP.

1. In the left navigation bar, click **Management** > **Update Software**. The following screen appears.



Tools -- Update Software

Step 1: Obtain an updated software image file from your ISP.

Step 2: Enter the path to the image file location in the box below or click the 'Choose Files' button to locate the image file.

Step 3: Click the 'Update Software' button once to upload the new image file.

NOTE: The update process takes about 2 minutes to complete, and your Broadband Router will reboot.

Software File Name:

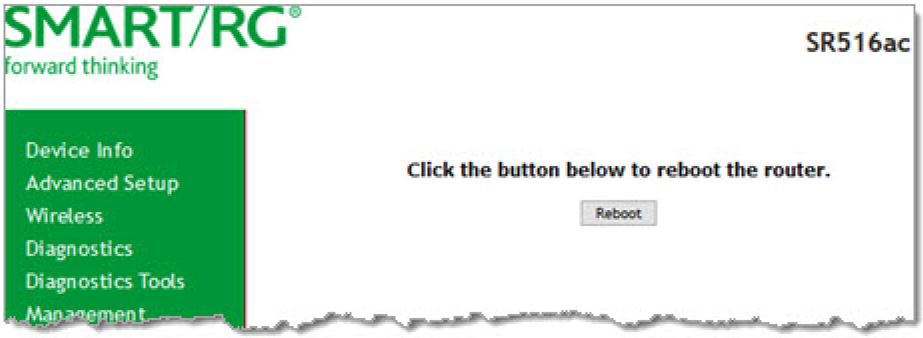
2. Click **Browse** to locate and select the correct software file.
3. Click **Update Software**.

   Note: When software update is in progress, do *not* shut down the gateway. After the software update completes, the gateway automatically reboots.

Reboot

On this page, you can reboot your gateway without needing physical access to the unit.

1. In the left navigation, click **Management** > **Reboot**. The following page appears.

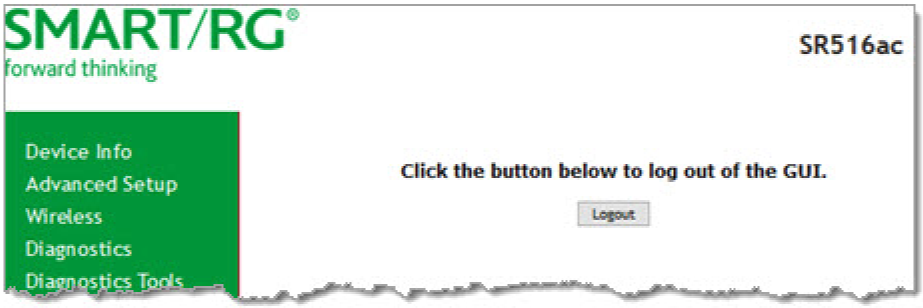


Click the button below to reboot the router.

2. Click **Reboot**. The gateway reboots and, after a few minutes, the Login dialog box appears.

Logout

1. To log out of your gateway, click **Logout** in the left navigation menu. The Logout page appears.



Click the button below to log out of the GUI.

2. Click the **Logout** button. A success message appears.

Appendix: FCC Statements

FCC Interference Statement

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numrique de la classe B est conforme Ã la norme NMB-003 du Canada.

FCC Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed an operated with a minimum distance of 20cm between the radiator and your body.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC - PART 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the bottom case of this equipment is a label that contains, among other information, a product identifier in the format US: VW7DL01BSR516A.

This equipment uses the following USOC jacks: RJ-11/RJ45/USB/Power Jacks.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See installation instructions for details.

Ringer Equivalency Number Statement

REN=0.1

Notice: The Ringer Equivalency Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact SmartRG,Inc. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this device does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

IC CS-03 statement

This product meets the applicable Industry Canada technical specifications. / Le présent matériel est conforme aux specifications techniques applicables d’Industrie Canada

The Ringer Equivalence Number (REN) is an indication of the maximum number of devices allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the RENs of all the devices not exceed five. / L’indice d’équivalence de la sonnerie (IES) sert à indiquer le nombre maximal de terminaux qui peuvent être raccordés à une interface téléphonique. La terminaison d’une interface peut consister en une combinaison quelconque de dispositifs, à la seule condition que la somme d’indices d’équivalence de la sonnerie de tous les dispositifs n’excède pas cinq.

Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

5GHz

5150-5250 MHz band is restricted to indoor operations only.

Revision History

Revision	Date	LAN ports
1.0	Sept 2017	Initial release of this user manual.
1.1	Jan 2018	Improved information for Power LED.